

218013
SA

WILLOUGHBY & HOEFER, P.A.

ATTORNEYS & COUNSELORS AT LAW
930 RICHLAND STREET
P.O. BOX 8416
COLUMBIA, SOUTH CAROLINA 29202-8416

MITCHELL M. WILLOUGHBY
JOHN M.S. HOEFER
RANDOLPH R. LOWELL
ELIZABETH ZECK*
BENJAMIN P. MUSTIAN
MICHAEL R. BURCHSTEAD
ANDREW J. MACLEOD

AREA CODE 803
TELEPHONE 252-3300
TELECOPIER 256-8062

TRACEY C. GREEN
ALAN WILSON
SPECIAL COUNSEL

*ALSO ADMITTED IN TX

July 20, 2009

VIA FIRST CLASS MAIL

The Honorable Charles L.A. Terreni
Chief Clerk/Administrator
Public Service Commission of South Carolina
Post Office Box 11649
Columbia, South Carolina 29211

RECEIVED
2009 JUL 20 PM 1:00
SC PUBLIC SERVICE
COMMISSION

RE: Lisa Lochbaum, Complainant/Petitioner v. Utilities Services of South Carolina,
Inc., Defendant/ Respondent. Docket No.: 2009-39-W

Dear Mr. Terreni:

Enclosed for filing on behalf of Utilities Services of South Carolina, Inc. please find the original and one (1) copy of the Surrebuttal Testimony of Bruce T. Haas in the above referenced matter. By copy of this letter, I am serving a copy of this document upon the parties of record and enclose a Certificate of Service to that effect.

I would appreciate your acknowledging receipt of these documents by date-stamping the extra copies that are enclosed and returning the same to me via the enclosed self-addressed envelope.

If you have any questions, or if you need any additional information, please do not hesitate to contact me.

Sincerely,

WILLOUGHBY & HOEFER, P.A.


Benjamin P. Mustian

BPM/cf

Enclosures

cc: Jeffrey M. Nelson, Esquire
Lisa Lochbaum

STATE OF SOUTH CAROLINA

(Caption of Case)

Lisa Lochbaum,

Complainant/Petitioner

v.

Utilities Services of South Carolina, Inc.

Defendant/Respondent.

BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

COVER SHEET

DOCKET

NUMBER: 2009 - 39 - W

(Please type or print)

Submitted by: John M. S. Hoefer

SC Bar Number: 2549

Address: Post Office Box 8416
Columbia, South Carolina 29202

Telephone: 803-252-3300

Fax: 803-771-2410

Other:

Email: jhoefer@willoughbyhoefer.com

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DOCKETING INFORMATION (Check all that apply)

☐ Emergency Relief demanded in petition ☒ Request for item to be placed on Commission's Agenda expeditiously

☐ Other:

- | | | | |
|--|--|--|--|
| <input type="checkbox"/> Electric | <input type="checkbox"/> Affidavit | <input type="checkbox"/> Letter | <input type="checkbox"/> Request |
| <input type="checkbox"/> Electric/Gas | <input type="checkbox"/> Agreement | <input type="checkbox"/> Memorandum | <input type="checkbox"/> Request for Certification |
| <input type="checkbox"/> Electric/Telecommunications | <input type="checkbox"/> Answer | <input type="checkbox"/> Motion | <input type="checkbox"/> Request for Investigation |
| <input type="checkbox"/> Electric/Water | <input type="checkbox"/> Appellate Review | <input type="checkbox"/> Objection | <input type="checkbox"/> Resale Agreement |
| <input type="checkbox"/> Electric/Water/Telecom. | <input type="checkbox"/> Application | <input type="checkbox"/> Petition | <input type="checkbox"/> Resale Amendment |
| <input type="checkbox"/> Electric/Water/Sewer | <input type="checkbox"/> Brief | <input type="checkbox"/> Petition for Reconsideration | <input type="checkbox"/> Reservation Letter |
| <input type="checkbox"/> Gas | <input type="checkbox"/> Certificate | <input type="checkbox"/> Petition for Rulemaking | <input type="checkbox"/> Response |
| <input type="checkbox"/> Railroad | <input type="checkbox"/> Comments | <input type="checkbox"/> Petition for Rule to Show Cause | <input type="checkbox"/> Response to Discovery |
| <input type="checkbox"/> Sewer | <input type="checkbox"/> Complaint | <input type="checkbox"/> Petition to Intervene | <input type="checkbox"/> Return to Petition |
| <input type="checkbox"/> Telecommunications | <input type="checkbox"/> Consent Order | <input type="checkbox"/> Petition to Intervene Out of Time | <input type="checkbox"/> Stipulation |
| <input type="checkbox"/> Transportation | <input type="checkbox"/> Discovery | <input type="checkbox"/> Prefiled Testimony | <input type="checkbox"/> Subpoena |
| <input checked="" type="checkbox"/> Water | <input type="checkbox"/> Exhibit | <input type="checkbox"/> Promotion | <input type="checkbox"/> Tariff |
| <input type="checkbox"/> Water/Sewer | <input type="checkbox"/> Expedited Consideration | <input type="checkbox"/> Proposed Order | <input checked="" type="checkbox"/> Other: Surrebuttal Test. |
| <input type="checkbox"/> Administrative Matter | <input type="checkbox"/> Interconnection Agreement | <input type="checkbox"/> Protest | |
| <input type="checkbox"/> Other: | <input type="checkbox"/> Interconnection Amendment | <input type="checkbox"/> Publisher's Affidavit | |
| | <input type="checkbox"/> Late-Filed Exhibit | <input type="checkbox"/> Report | |

BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA
DOCKET NO. 2009-39-W

RECEIVED
 2009 JUL 21 PM 10:28
 SOUTH CAROLINA
 PUBLIC SERVICE
 COMMISSION

IN RE:)
)
 Lisa Lochbaum,)
)
 Complainant/Petitioner)
)
 v.)
)
 Utilities Services of South Carolina, Inc.,)
)
 Defendant/Respondent.)
 _____)

SURREBUTTAL TESTIMONY
OF
BRUCE T. HAAS

- 1 **Q. ARE YOU THE SAME BRUCE T. HAAS WHO HAS PRE-FILED DIRECT**
 2 **TESTIMONY IN THIS MATTER?**
- 3 **A. Yes, I am.**
- 4 **Q. WHAT IS THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY IN THIS**
 5 **PROCEEDING, MR. HAAS?**
- 6 **A. The purpose of my surrebuttal testimony is to respond to the rebuttal testimony of Ms. Lisa**
 7 **Lochbaum that has been pre-filed in this proceeding.**
- 8 **Q. DO YOU ASSERT IN YOUR DIRECT TESTIMONY THAT THE CONSUMPTION**
 9 **REFLECTED ON MS. LOCHBAUM'S JUNE AND JULY BILLS WAS**

1 **ESTIMATED?**

2 A. No, I do not. Although some customers' bills did contain estimated consumption figures for
3 that period, my testimony is not that Ms. Lochbaum received a bill based on estimated reads
4 for that period. To the contrary, my testimony is that Ms. Lochbaum did not receive a June
5 or July bill.

6 **Q. CAN YOU COMMENT ON MS. LOCHBAUM'S CONTENTIONS REGARDING**
7 **THE MANNER IN WHICH USSC'S MAILING SERVICE AND THE UNITED**
8 **STATES POSTAL SERVICE HANDLE BAR CODING ISSUES?**

9 A. Yes, but not to the extent that I can dispute anything she has stated in regard to how bar
10 coded bulk mail is handled by mailing services or the postal service. I understand that Ms.
11 Lochbaum is employed by a postal meter company and is therefore likely to be more
12 knowledgeable about such matters than am I. She states that any significant delay in billings
13 being mailed due to bar coding errors are more than likely to result from the mailing service
14 requesting the postal service not to send a mailing and I would accept her assertion in that
15 regard. I would note that USSC has terminated its relationship with the mailing service that
16 was being used in the summer of 2008. As Ms. Lochbaum points out, the consumption
17 periods reflected in our billings do still lag behind the billing date and we are continuing to
18 work to correct that problem. I would note, however, that this lag did not cause any financial
19 harm to Ms. Lochbaum inasmuch as she has been given a deferred payment plan that is more
20 generous than the Commission's regulations require. And there is certainly no benefit to the
21 Company when bills issued do not reflect recent customer consumption periods. To the
22 contrary, this problem is a detriment to the Company and we sincerely regret that it has

1 occurred.

2 **Q. IS MS. LOCHBAUM CORRECT THAT SHE INCURRED \$839.85 IN WATER**
3 **CHARGES FOR JUNE, JULY AND AUGUST OF 2008?**

4 A. No, she is not.

5 **Q. WOULD YOU PLEASE EXPLAIN YOUR LAST ANSWER?**

6 A. Yes, I will. Ms. Lochbaum was billed \$536.98 for consumption of 65,100 gallons during the
7 sixty-five day period running from May 21, 2008, to July 25, 2008. She was billed \$294.82
8 for consumption of 33,880 gallons during the fifty-nine day period running from July 25,
9 2008, to September 22, 2008. So, the dollar amount she has referenced in this part of her
10 rebuttal testimony actually covers a greater period of time than she asserts. Copies of the
11 pertinent billing statements are attached to my testimony as Surrebuttal Exhibit "A". If you
12 assume that half of the consumption billed for August and September 2008 occurred in
13 August, Ms. Lochbaum was billed \$684.39 for 82,100 gallons of water consumed during the
14 June through August 2008 period.

15 **Q. WHAT WAS MS. LOCHBAUM BILLED FOR WATER CONSUMPTION DURING**
16 **THE JUNE THROUGH AUGUST PERIOD IN 2007?**

17 A. She was billed \$536.70 for 88,020 gallons of water consumed in that time frame. Copies of
18 these bills are attached to my testimony as Surrebuttal Exhibit "B".

19 **Q. CAN YOU EXPLAIN WHY MS. LOCHBAUM'S CONSUMPTION WOULD BE**
20 **HIGHER, YET HER BILL BE LOWER, FOR CONSUMPTION DURING JUNE**
21 **THROUGH AUGUST IN 2007 THAN IT WAS IN 2008?**

22 A. Yes. In April of 2008 the company exercised its right to place higher rates into effect under

1 bond pending its appeal from the Commission's orders denying rate relief in Docket Number
2 2007-286-WS. So, the bill for June through August consumption in 2008, which was only
3 7% lower than her consumption during this period in 2007, would have been higher than in
4 2007.

5 **Q. DO YOU AGREE WITH MS. LOCHBAUM THAT THE DELAY IN THE BILLINGS**
6 **TO HER FOR JUNE THROUGH AUGUST CONSUMPTION IN 2008 WAS A**
7 **CAUSE FOR HER CONSUMPTION LEVELS?**

8 A. No, I do not. Given the fact that she acknowledges in her rebuttal testimony that she was
9 engaging in irrigation for newly planted grass plugs in 2007 and newly planted shrubs in
10 2008, and the fact that her consumption is fairly consistent over the two summers in these
11 years, I believe that Ms. Lochbaum was aware of the level of her consumption.

12 **Q. WHAT COMMENT DO YOU HAVE REGARDING MS. LOCHBAUM'S**
13 **REBUTTAL TESTIMONY ADDRESSED TO THE PASS-THROUGH PROVISION**
14 **OF USSC'S RATE SCHEDULE?**

15 A. Ms. Lochbaum is simply incorrect in her statements regarding this issue. USSC is applying
16 the pass-through provision in accordance with the rate schedule approved by the
17 Commission. Additionally, the fact that the Commission requires USSC to inform the
18 Commission and customers of any notice of increase in wholesale rates given to USSC by
19 bulk providers belies her assertion that the Commission, or ORS, believed that the Dutchman
20 Shores Subdivision customers would only be charged about \$15 per month in water supply
21 charges. The schedule taken from the testimony of ORS witness Dawn Hipp in Docket
22 Number 2005-217-WS was clearly for illustrative purposes only and intended to demonstrate

1 the current effect on customers which would be transitioning to the water distribution only
2 rates provided for in the proposed rate schedule in that docket. Contrary to Ms. Lochbaum's
3 testimony, it is not reasonable to assume that water supply charges would track bulk rates.
4 ORS has never taken this position and it was the sponsor of Ms. Hipp's testimony. Had that
5 been ORS's intent, it would not have felt it necessary to recommend the 10% unaccounted
6 for water standard to the Commission in Docket Number 2007-286-WS. And, while I
7 disagree with Ms. Lochbaum's assertions that the Commission is not cognizant of how
8 unaccounted for water effects water charges to customers, USSC has proposed a new billing
9 approach for customers in Dutchman Shores which would address that issue by formally
10 adopting the 10% unaccounted for water standard approved by the American Waterworks
11 Association. This proposal, which has other benefits, is described in my direct testimony.

12 **Q. MS. LOCHBAUM SUGGESTS THAT USSC HAS THE ABILITY TO INSTALL**
13 **WELLS IN DUTCHMAN SHORES AND SHOULD DO SO; WOULD YOU PLEASE**
14 **COMMENT ON THAT?**

15 A. Yes. Again, Ms. Lochbaum is incorrect in her contention. The wells that previously served
16 Dutchman Shores were taken out of service by a utility that previously owned and operated
17 the system, Heater Utilities, Inc., as a result of a DHEC order that the system be
18 interconnected with the City of Columbia system due to lack of water capacity in the wells.
19 There is not adequate ground water capacity in the area to support a well system for
20 Dutchman Shores and the City of Columbia is aware of this fact by virtue of the need for the
21 interconnection by the prior owners. USSC would certainly prefer to own and operate its
22 water supply source, but that is not feasible in this instance.

1 **Q. IS MS. LOCHBAUM CORRECT THAT THE CITY OF COLUMBIA AND USSC**
2 **ARE BOTH PROFITTING AS A RESULT OF THE PASS-THROUGH PROVISION**
3 **OF THE COMPANY'S RATE SCHEDULE?**

4 A. No, she is not. As Exhibit "E" to my direct testimony demonstrates, USSC is not collecting
5 from customers more than what the City bills USSC for bulk water in Dutchman Shores.
6 The City's bill is passed through to our customers on a pro rata basis without markup in
7 accordance with our rate schedule. As to whether the City of Columbia profits from the sale
8 of bulk water to USSC, I cannot say with certainty. But I would assume that it does.

9 **Q. WOULD USSC NOTICE THAT BULK PROVIDERS OF WATER INCREASE**
10 **THEIR RATES AS MS. LOCHBAUM SUGGESTS SHOULD BE THE CASE?**

11 A. Not necessarily. If a bulk provider does not provide us notice of an increase, the only way
12 we would notice an increase would be if the amounts of bulk bills over some period of time
13 reflect a noticeable increase. In fact, Ms. Lochbaum's Complaint Exhibit "I" and the
14 Company's Answer Exhibit "C" establish that the total charges to USSC by the City of
15 Columbia for bulk water service to the Dutchman Shores Subdivision for the September
16 2007 to October 2008 period referenced in Ms. Lochbaum's complaint were less than the
17 total charges the city billed to USSC over the same period in 2006 to 2007. And, there is no
18 issue of the City's bills being correct in this case, so the lack of any notice did not harm
19 USSC or its customers financially. I would further note that there are many other
20 jurisdictional water utilities with pass-through provisions in their approved rate schedules
21 which are not required to inform the Commission or customers when an increase in bulk
22 rates occurs.

1 **Q. DOES USSC HAVE AN INCENTIVE TO CONTROL WATER LOSS?**

2 A. Of course it does. In addition to water loss audits which may be conducted by ORS from
3 time to time, the company's performance with respect to unaccounted for water is always
4 subject to audit by ORS and review by the Commission in rate proceedings. In fact, in
5 Docket Number 2007-286-WS, ORS recommended inclusion of the 10% unaccounted for
6 water standard in the Company's rate schedule. This standard, which is recognized by the
7 American Waterworks Association, has been recognized by this Commission as being
8 appropriate in other proceedings. And, the alternative for billing the pass-through of bulk
9 water charges that I proposed in my direct testimony provides for an annual accounting "true-
10 up" which will adjust for unaccounted for water in excess of the 10% standard and can
11 certainly be audited.

12 **Q. MS. LOCHBAUM CONTENDS THAT USSC SHOULD SHARE IN THE**
13 **RESPONSIBILITY FOR HER HIGH CONSUMPTION THAT SHE CONTENDS**
14 **RESULTED FROM HIGH WATER PRESSURE AT HER RESIDENCE; WHAT IS**
15 **YOUR RESPONSE TO THAT CONTENTION?**

16 A. My response is that the Company bears no responsibility in this regard.

17 **Q. WOULD YOU PLEASE ELABORATE ON THAT ANSWER?**

18 A. Yes. First, USSC has not violated any regulation regarding water pressure. As I have
19 previously testified, the high pressure in our system was the result of events beyond the
20 control of the Company in that it was caused by problems in the City of Columbia's
21 distribution system. Second, with respect to Ms. Lochbaum's assertion that high pressure
22 caused her customer service line to break in December of 2007, I would note that this was

1 not raised in either her complaint or her pre-filed direct testimony in this case. In any event,
2 the incidence of high pressure involving the City of Columbia distribution system occurred
3 some eleven months after the new incidence of high pressure that Ms. Lochbaum addresses
4 in her rebuttal testimony. Moreover, Company records do not reflect any request by Ms.
5 Lochbaum for a leak adjustment to her account for December 2007 consumption based upon
6 a customer service line break asserted to have been caused by high pressure. In fact,
7 Company records show that, other than to establish service, the only time she has ever
8 contacted us prior to October of 2008 was on June 14, 2007, when she requested that we
9 meet her landscaper to coordinate the installation of her irrigation system. Ms. Lochbaum is
10 also incorrect in her assertion that a pressure reducing device was not required to be installed
11 in her premises when she built her home. The Lexington County Building Code Ordinance
12 that was in effect in 2006 and 2007 is no different from the one that was adopted by
13 Lexington County in April of 2008 that I attached as Exhibit "B" to my direct testimony
14 because the earlier ordinance also required that pressure reducing devices be installed
15 whenever water pressure may exceed eighty pounds per square inch, or "PSI". I attach hereto
16 as my Surrebuttal Exhibit "C" a certified true copy of the Lexington County Building Code
17 ordinance which was in effect at the time Ms. Lochbaum's house was constructed. Because
18 Commission regulations permit water pressure of up to 125 PSI, the reducer valve was
19 required by the ordinance to be installed on Ms. Lochbaum's premises. Compliance with the
20 ordinance is the responsibility of Ms. Lochbaum and not USSC.

21 **Q. DO YOU AGREE THAT THE INSTALLATION OF A PRESSURE REDUCING**
22 **VALVE IN MS. LOCHBAUM'S PREMISES FULLY EXPLAINS THE REDUCTION**

1 **IN HER CONSUMPTION SHE DESCRIBES IN HER REBUTTAL TESTIMONY?**

2 A. No, I do not for several reasons. First, Ms. Lochbaum can always affect her consumption by
3 changing her usage patterns. Given her complaint about the level of her bill, I believe it fair
4 to assume that she has in fact reduced her consumption. Second, she acknowledges that she
5 engaged in “a tremendous amount” of irrigation in 2007 to foster growth of newly planted
6 grass plugs and continued to irrigate to foster growth of newly planted shrubs in 2008. I
7 doubt that she is continuing to have to irrigate to the same levels as she did in order to
8 encourage that plant growth. Third, this part of South Carolina has experienced a much
9 wetter than normal year to date and the declaration of the drought that existed in 2007 and
10 2008 has been lifted by state authorities. Thus, the amount of irrigation consumption for
11 lawns, yards and gardens is naturally lower. Finally, I assume that she is not draining and
12 refilling her swimming pool or washing her brick on an annual basis, so that amount of
13 consumption would not be repeated.

14 **Q. MS. LOCHBAUM STATES IN HER REBUTTAL TESTIMONY THAT SHE HAS**
15 **NOT RECEIVED DATA SHOWING HOW USSC CALCULATED HER WATER**
16 **SUPPLY CHARGES AND CRITICIZING THE ANALYSIS IN YOUR DIRECT**
17 **TESTIMONY REGARDING THE PASS-THROUGH PROVISION OF THE**
18 **COMPANY’S RATE SCHEDULE; WOULD YOU PLEASE COMMENT ON THAT?**

19 A. Yes. Ms. Lochbaum has not served any discovery on the Company in this proceeding. And I
20 am not aware of any informal request by her to the Company for information in this regard.
21 Having said that, I would note that Ms. Lochbaum has copies of the bulk bills issued by the
22 City of Columbia to USSC in 2007 and 2008 for the period she claimed in her complaint was

1 pertinent. In the Company's responsive pleadings and in my testimony, it has been explained
2 that USSC divides the total amount of the bulk bill received among all customers based upon
3 their relative, individual metered consumption and passes that amount on to the customers
4 without markup in the water supply charge that is reflected on the invoice. I have also
5 explained why the water supply charge per thousand gallons will not match the per thousand
6 gallons bulk charge imposed by the City of Columbia, which is primarily due to the lag in
7 receiving bulk bills and unaccounted for water. No additional information will change these
8 facts. My direct testimony includes an exhibit demonstrating the total amount of bulk
9 charges imposed by the City and the total amount of pass-through collected by USSC over
10 four different twelve month periods relevant to Ms. Lochbaum's complaint. These amounts
11 are consistent with one another, particularly when the effects of the bulk billing time lag are
12 taken into account. Ms. Lochbaum wants the Commission to interpret the pass-through
13 provision of the Company's rate schedule as providing that USSC may only collect from
14 customers a per thousand gallons water supply charge which is the same as that imposed by a
15 bulk provider. However, that is not what the rate schedule provides.

16 **Q. HAS USSC EXPERIENCED ERRORS IN ITS CALCULATION OF THE WATER**
17 **SUPPLY CHARGE TO CUSTOMERS IN DUTCHMAN SHORES?**

18 A. Unfortunately, we have. USSC's investigation of another customer's claim regarding the
19 accuracy of the water supply charges imposed in Dutchman Shores has revealed a billing
20 error in which sixteen customers were inadvertently charged the pass-through amount in
21 effect for a prior period which was lower than that which should have applied in the May 21,
22 2008 through June 19, 2008 billing period, while another twenty-five customers in the

1 Dutchman Shores subdivision were inadvertently charged a pass through amount in excess of
2 the correct amount for the same billing period. Ms. Lochbaum was one of these twenty-five
3 customers and a credit in the amount of \$27.71 has been issued to her account to rectify this
4 error. We do apologize to her for this mistake. All of the other twenty-four customers who
5 were overcharged will also be given a credit and none of the customers who were
6 undercharged will be back-billed for the amount of the undercharge. Also, we are continuing
7 our investigation in this regard and if other errors are found, any customers who have been
8 overcharged will be given a credit.

9 **Q. MS. LOCHBAUM EXPRESSES DOUBTS ABOUT THE EFFICACY OF YOUR**
10 **PROPOSAL THAT USSC BE ALLOWED TO ESTIMATE BULK CHARGES; WILL**
11 **YOU PLEASE COMMENT ON THAT PART OF HER TESTIMONY?**

12 A. Yes, I will. Ms. Lochbaum states that she wants an explanation of how this proposal would
13 result in a “more levelized supply rate.” I am not certain of what she means by that
14 statement. However, the benefit that the Company believes that customers will realize is that
15 the water supply charges billed will be based upon current customer and bulk consumption
16 and not the mismatch of current month customer consumption and previous month bulk
17 consumption. This should have the effect of eliminating the drastic swings between the
18 amount of pass-through charges to customers in the manner I have depicted in the second
19 section of Exhibit “D” to my direct testimony. In other words, because water supply charges
20 would be figured using customer and bulk consumption from the same time period, there
21 would be less dramatic changes in the water supply charges during a year. So, if by a more
22 “levelized supply rate” Ms. Lochbaum means fewer and less dramatic changes in the water

1 supply rates customers will experience, I believe our proposal does that.

2 **Q. WOULD THE PROPOSAL ENABLE MS. LOCHBAUM TO AUDIT HER SUPPLY**
3 **CHARGES?**

4 A. Not on an individual basis and it is not intended to do so. But Ms. Lochbaum would be able
5 to compare the amount of water supply charges collected from the customers in Dutchman
6 Shores and the amount of bulk bills imposed by the City of Columbia on USSC on an annual
7 basis when the true-up is performed. She will also be able to compare the amount of bulk
8 water metered to USSC by the City and the amount of water sold to customers in the
9 subdivision on an annual basis, which would reflect unaccounted for water levels.

10 **Q. IS MS. LOCHBAUM CORRECT IN ASSERTING THAT SYSTEM USAGE AND**
11 **UNACCOUNTED FOR WATER SHOULD NOT BE FACTORS IN THE ANNUAL**
12 **“TRUE-UP” YOU PROPOSE?**

13 A. No, she is not. Water utilities that supply their own water are not penalized for system usage,
14 non-account water, or acceptable levels of unaccounted for water in the ratemaking context
15 and there is no reason why a water utility distributing bulk water should be so penalized.

16 **Q. WHY SHOULD DOCUMENTED LEAKS BE ADJUSTED OUT WHEN THE “TRUE-**
17 **UP” IS PERFORMED?**

18 A. If there is a line break for which the amount of lost water can be documented, it is no longer
19 unaccounted for water, but non-account water. Examples of this would be where a line is
20 broken and the Company effects repairs and can document the amount of water lost.

21 **Q. MS. LOCHBAUM ALSO CRITICIZES YOUR PROPOSAL BECAUSE IT DOES**
22 **NOT ADDRESS COMPARATIVE WATER RATES, HIGH PRESSURE**

**MONITORING, TIMELY BILLING AND THE COST BASIS FOR THE
COMPANY'S DISTRIBUTION RATE; WOULD YOU COMMENT ON THAT?**

A. Yes. The proposal is not intended to directly address any of these points. And, although I have addressed these points in other areas of my direct testimony, I will further address them here. USSC does not believe it appropriate to compare our rates to those charged by governmental providers – particularly when a significant portion of what we collect is paid over to the governmental provider. And, as has I have also previously stated, the high pressure situation is one that is not of the Company's making. We believed that the City of Columbia was taking steps to address this problem on a going forward basis. However, in view of the fact that the City's efforts have not completely resolved this problem, the Company is willing to make modifications to its distribution system to reduce the effect of high pressure from the City of Columbia distribution. These modifications, which we estimate will cost approximately twenty five thousand dollars, would require engineering design, pre-approval from the City of Columbia, and permitting by DHEC. The Company also recognizes that timely billing is an issue and we have been working to correct that problem. This issue arises out of the problems we experienced with the transition of our billing system to the Customer Care and Billing, or "CC&B", system in the summer of 2008 and limitations in the system which have prevented us from issuing a "catch-up" bill to customers. As I have previously testified, due to problems with CC&B, some customers went several months last summer without receiving a bill and Ms. Lochbaum was one of them. Because of design limitations, CC&B would not allow the Company to issue a separate, new bill to catch-up unbilled consumption until the due date of any outstanding bill

1 had expired. We have now corrected that limitation and will be able to issue a catch-up bill
2 to customers. However, because we know that an extra bill would create an additional
3 financial obligation for customers, the Company is going to wait until consumption is at its
4 lowest, probably in early 2010, to issue a separate catch-up bill to customers. The amount
5 billed will not include any penalty or interest and, when it is issued, a twelve month deferred
6 payment plan will be offered to customers which will also not include any penalty or interest.

7 In that manner, the two month billing lag that some customers have experienced can be
8 eliminated with the least amount of inconvenience to the customer.

9 **Q. DO YOU AGREE THAT THE PASS-THROUGH MECHANISM APPROVED BY**
10 **THE COMMISSION FOR USSC RESULTS IN GROSSLY UNFAIR RATES TO**
11 **DISTRIBUTION ONLY CUSTOMERS?**

12 A. No, I do not. Rate design is a matter within the Commission's discretion. Ms. Lochbaum's
13 testimony ignores the fact that bulk rates imposed by governmental providers are not subject
14 to Commission regulation and that USSC already collects less in rates from distribution only
15 water customers than from its other customers. And, her recommended solution to her
16 dissatisfaction with the pass-through mechanism appears to be that other customers in
17 different subdivisions, and even different counties, who are not distribution only customers
18 should pay even higher rates than they do now.

19 **Q. MS. LOCHBAUM STATES THAT SHE HAS NOT RECEIVED A CALCULATION**
20 **OF COSTS WHICH SUPPORTS USSC'S DISTRIBUTION RATE AS SHE HAS**
21 **REQUESTED; WOULD YOU ADDRESS THAT STATEMENT?**

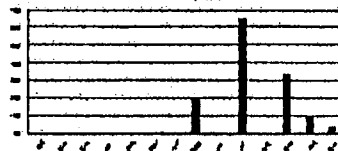
22 A. Again, Ms. Lochbaum has not requested that information of USSC in discovery or even

1 informally. Further, she appears to assert that because she does not have this information, the
2 cost basis supporting USSC's distribution rate was not scrutinized in the rate-making
3 proceedings in which the Company's distribution rates were established. I do not see a
4 logical connection between information in her possession and the analysis of evidence
5 supporting rates established in prior rate cases. Further, the Company's submissions with
6 respect to its operations and maintenance expenses and capital expenses and the ORS reports
7 of its audit of these expenses in the last two rate cases are public records and Ms. Lochbaum
8 has access to them. These, along with the testimony of witnesses in each case, which
9 included several certified public accountants, formed part of the basis for the determination
10 of the distribution rate in conjunction with the determination of the Company's other water
11 rate and its sewer rates. Although Ms. Lochbaum does not want to accept that determination,
12 she does not point to any basis upon which it can be concluded that the distribution rate
13 imposed on Dutchman Shores customers, which is the same as that imposed on other
14 distribution only customers, is unjust. And, to the extent that Ms. Lochbaum is seeking a
15 delineation of the Company's expenses solely as they relate to the provision of distribution
16 only water service to customers in Dutchman Shores, that information does not exist since
17 the Company does not maintain expense records on a subdivision by subdivision basis.
18 USSC is regulated by the Commission on a statewide basis.

19 **Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?**

20 **A.** Yes, it does.

Haas Surrebuttal Testimony Docket No.: 2009-39-W



UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Acct #
Due Date 08/03/07 Amount Paid
Please Pay Credit Balance \$

LISA LOCHBAUM
221 DUTCHMAN SHORES DR
CHAPIN SC 29036

UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Service Address Telephone #

Current #: (803) 548-2304

To insure proper credit, return this portion. Please do not staple, clip, or tape.

**** PLEASE VISIT OUR WEBSITE AT www.uiwater.com ****

Remittance Address:
UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

For Service or Billing Inquiries Call:
803-796-9545 OR 800-367-4314

To Pay By Credit or Debit Card, Call 1-877-527-7852.
A Convenience Fee Will Be Charged.

Account #	Description of Charges	Amount
08	PRIOR BALANCE	\$-99.15
	SC DHEC FEE	\$1.78
	WATER DISTRIBUTION CHARGE	\$27.34
	CITY WATER SUPPLY CHARGE	\$20.86
07/09/07		
Due Date 08/03/07		
Read 05/23/07 54450		
Read 06/20/07 60230		
Usage 5780		
Days this period 28		
Daily usage 206		
Daily water cost \$1.04		
Daily sewer cost \$0.00		
Payment 06/20/07 \$160.97		

1/2% PER MONTH WILL BE ADDED TO
AMOUNTS NOT PAID BY THE DUE DATE. Credit Balance DO NOT PAY \$-49.17

PLEASE PROVIDE YOUR SERVICE ADDRESS PHONE NUMBER

ON THE NET REMITTANCE FORM

WE MAY CONTACT YOU IN THE EVENT OF A SERVICE RELATED EMERGENCY.

HELP US MAINTAIN SECURITY SURROUNDING YOUR DRINKING WATER SYSTEMS,
PLEASE CALL OUR OFFICE AND THE POLICE IF YOU NOTICE SUSPICIOUS ACTIVITY.

PAYMENT OPTIONS -- \$\$\$ -- WE CAN AUTOMATICALLY DRAFT YOUR PAYMENT FROM YOUR
SAVINGS/CHECKING ACCOUNT FREE OF CHARGE. FOR INFORMATION, CALL OUR CUSTOMER
SERVICE DEPARTMENT AT THE SERVICE & BILLING INQUIRY NUMBER LISTED ABOVE.

PAY BY CREDIT, DEBIT (VISA & MASTERCARD) OR ELECTRONIC CHECK, CALL
1-877-527-7852. PAYMENTS MADE ON ANY VISA CARD THAT CAN BE USED AS A DEBIT
CREDIT CARD WILL BE PROCESSED AS A DEBIT CARD. PAY OVER THE INTERNET BY
ACCESSING PAYBYINTERNET.COM. MAKE INTERNET PAYMENTS TO OUR PARENT COMPANY
UTILITIES INC. THERE IS A FEE FOR THESE PAYMENT OPTIONS. *****

***** YOU MUST ALLOW FOR CREDIT/DEBIT CARD PROCESSING TIME. *****

TO ASSURE PROPER CREDIT TO YOUR ACCOUNT FOR ONLINE OR PHONE PAYMENTS, **
** PLEASE ENTER YOUR 12 DIGIT WATER/SEWER ACCOUNT NUMBER CAREFULLY. ****

Rate Schedule Available Upon Request

Utilities, Inc and Affiliated Companies**EXHIBIT 3**

UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Acct #
Due Date 09/01/07 Amount Paid
Please Pay \$129.30

LISA LOCHBAUM
221 DUTCHMAN SHORES DIR.
CHAPIN SC 29036

UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Service Address Telephone #

Current #: (803) 546-2304

To insure proper credit, return this portion. Please do not staple, clip, or tape.

*** PLEASE VISIT OUR WEBSITE AT www.uiwater.com ***

Remittance Address:
UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

For Service or Billing Inquiries Call:
803-796-9545 OR 800-367-4314
To Pay By Credit or Debit Card, Call 1-877-527-7852.
A Convenience Fee Will Be Charged.

Account #	AC	in	Description of Charges	
Service Addr.	221 DUTCHMAN SHORES CIR		PRIOR BALANCE	\$-49.17
Bill Date	08/07/07	Due Date 09/01/07	SC DHEC FEE	\$1.78
Prior Read	06/20/07	60230	WATER DISTRIBUTION CHARGE	\$85.13
Current Read	07/25/07	91810	CITY WATER SUPPLY CHARGE	\$91.56
Usage		31580		
# of days this period		35		
Average daily usage		902		
Average daily water cost		\$2.48		
Average daily sewer cost		\$0.00		
Last Payment				

1. 1/2% PER MONTH WILL BE ADDED TO
ALL AMOUNTS NOT PAID BY THE DUE DATE. Please Pay \$129.30

PLEASE PROVIDE YOUR SERVICE ADDRESS/PHONE NUMBER
ON THE NET REMITTANCE FORM

SO WE MAY CONTACT YOU IN THE EVENT OF A SERVICE RELATED EMERGENCY.

TO HELP US MAINTAIN SECURITY SURROUNDING YOUR DRINKING WATER SYSTEMS,
PLEASE CALL OUR OFFICE AND THE POLICE IF YOU NOTICE SUSPICIOUS ACTIVITY.

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SAVINGS/CHECKING ACCOUNT FREE OF CHARGE. FOR INFORMATION, CALL OUR CUSTOMER
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OR CREDIT CARD WILL BE PROCESSED AS A DEBIT CARD. PAY OVER THE INTERNET BY
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UTILITIES INC. THERE IS A FEE FOR THESE PAYMENT OPTIONS. *****

***** YOU MUST ALLOW FOR CREDIT/DEBIT CARD PROCESSING TIME. *****

** TO ASSURE PROPER CREDIT TO YOUR ACCOUNT FOR ONLINE OR PHONE PAYMENTS, **

**** PLEASE ENTER YOUR 12 DIGIT WATER/SEWER ACCOUNT NUMBER CAREFULLY. ****

Rate Schedule Available Upon Request

Utilities, Inc. and Affiliated Companies

EXHIBIT J

UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Acct #

Due Date 10/05/07

Amount Paid

Please Pay \$308.33

LISA LOCHBAUM
221 DUTCHMAN SHORES DR
CHAPIN SC 29036

UTILITIES SERVICES OF SC
PO BOX 240908
CHARLOTTE NC 28224-0908

Service Address Telephone #

Current #: (803) 548-2304

To insure proper credit, return this portion. Please do not staple, clip, or tape.

*** PLEASE VISIT OUR WEBSITE AT www.uiwater.com ***

Remittance Address:
UTILITIES SERVICES OF SC
PO BOX 240908

For Service or Billing Inquiries Call:
803-796-9545 OR 800-367-4314

To Pay By Credit or Debit Card, Call 1-877-527-7852.
A Convenience Fee Will Be Charged.

Account #	Description of Charges	Amount
1908	PRIOR BALANCE	\$0.00
	SC DHEC FEE	\$1.78
	WATER DISTRIBUTION CHARGE	\$127.87
	CITY WATER SUPPLY CHARGE	\$178.68
Count #		
Service Address: 221 DUTCHMAN SHORES CIR		
Date 09/10/07 Due Date 10/05/07		
Read 07/25/07 91810		
Ant Read 08/21/07 142470		
Je 50660		
days this period 27		
age daily usage 1876		
age daily water cost \$4.80		
age daily sewer cost \$0.00		
Payment 08/29/07 \$129.30		

/2% PER MONTH WILL BE ADDED TO

AMOUNTS NOT PAID BY THE DUE DATE. Please Pay

\$308.33

PLEASE PROVIDE YOUR SERVICE ADDRESS PHONE NUMBER

ON THE NET REMITTANCE FORM

WE MAY CONTACT YOU IN THE EVENT OF A SERVICE RELATED EMERGENCY.

HELP US MAINTAIN SECURITY SURROUNDING YOUR DRINKING WATER SYSTEMS.
PLEASE CALL OUR OFFICE AND THE POLICE IF YOU NOTICE SUSPICIOUS ACTIVITY.

PAYMENT OPTIONS -- \$\$\$ -- WE CAN AUTOMATICALLY DRAFT YOUR PAYMENT FROM YOUR
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UTILITIES INC. THERE IS A FEE FOR THESE PAYMENT OPTIONS. *****

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TO ASSURE PROPER CREDIT TO YOUR ACCOUNT FOR ONLINE OR PHONE PAYMENTS, **
PLEASE ENTER YOUR 12 DIGIT WATER/SEWER ACCOUNT NUMBER CAREFULLY. ****

Rate Schedule Available Upon Request

Surrebuttal Exhibit C

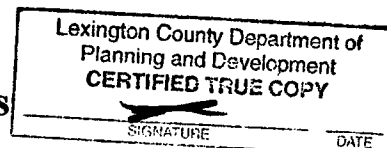
Page 1 of 46

Haas Surrebuttal Testimony Docket No.: 2009-39-W

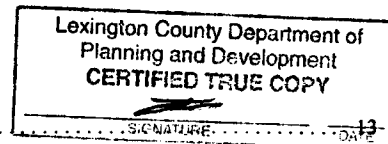
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ARTICLE 1 - ADMINISTRATION

Section 1-1 General

Lexington County Department of
Planning and Development
CERTIFIED TRUE COPY

1-1.1 Purpose

The purpose of the Ordinance is to provide minimum requirements to safeguard health and public welfare through structural strength, means of egress, stability, sanitation, adequate light and ventilation and to provide safety to life and property from fire and other hazards attributed to the built environment.

1-1.2 Scope

The provisions of this Ordinance shall apply to the construction, alteration, repair, equipment, use and occupancy, location, maintenance, removal and demolition, of every building, structure installation or any appurtenances connected or attached to such buildings or structures.

1-1.3 Title

The provisions embraced within the following articles and sections shall constitute, be known and cited as the "Building Codes Ordinance for Lexington County, South Carolina," hereafter referred to as the "Ordinance".

1-1.4 Area of Applicability

This Ordinance shall apply to the unincorporated areas of Lexington County and those municipalities which make an agreement with the Lexington County Council to be regulated, in like fashion, by the terms of this Ordinance.

1-1.5 Validity

In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

1-1.6 Conflict With Other Ordinances

Whenever the provisions of this Ordinance impose more restrictive standards than are required in or under any other ordinance or regulation, the standards herein contained shall prevail. Whenever the provisions of any other ordinance or regulation requires more restrictive standards than are required herein, the requirements of such ordinance or regulation shall prevail.

1-1.7 Saving Clauses

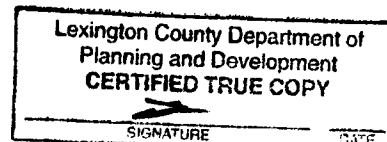
- a. No provisions of this Ordinance shall be held to deprive any federal or state agency, or any applicable governing body having jurisdiction, of any power or authority which it had on the effective date of this Ordinance or of any remedy then existing for the enforcement of its orders, nor shall it deprive any individual or corporation of its legal rights as provided by law.
- b. Nothing in this ordinance shall be construed to affect any suit or proceeding now pending in any court, or any right acquired, or liability incurred nor any cause or causes of action accrued or existing, under any act or ordinance repealed hereby. Nor shall any right or remedy of any character be lost, impaired or affected by this Ordinance.

1.1.8 Effective Date

This Ordinance shall take effect and be enforced from and after April 23, 1973.

[Amended on March 11, 1974: March 13, 1989: October 1, 1995: July 1, 1996: November 1, 1999:
July 1, 2001: July 1, 2002 : June 10, 2003]

7-1-96
After 2-1-95
After 2-1-95
After 2-1-95



Section 1-2 Organization

1-2.1 Office of Building Inspections

There is hereby established an Office of Building Inspections.

1-2.2 Building Official

Within the Office of Building Inspections there is hereby established the position of Building Official for Lexington County and the Building Official shall:

- a. Operate the Office of Building Inspections;
- b. Administer and enforce this Ordinance as provided in Section 1-3;
- c. Perform any related duties as directed by the County Administrator;
- d. Be employed by Lexington County through the County Administrator, and in accordance with the personnel policies and/or procedures of Lexington County.

1-2.3 Building Inspectors

The Building Official shall supervise such Building Inspectors as employed by the County Administrator and in accordance with the personnel policies and/or procedures of Lexington County.

1-2.4 Deputy

The Building Official shall designate as his deputy a qualified employee in the Office of Building Inspections who shall, during the absence or disability of the Building Official, exercise all powers and duties of the Building Official.

1-2.5 Other Staff

The Building Official shall supervise any other necessary staff to fulfill the provisions of this Ordinance as employed by the County Administrator and in accordance with the personnel policies and/or procedures of Lexington County.

1-2.6 Restrictions on Employees



No employee of the Office of Building Inspections shall be financially interested in the furnishing of labor, material, or appliances for the construction, alteration, or maintenance of a building, or in the making of plans or of specifications for any building or structure located within the area of applicability as defined in section 1-1.4 of this Ordinance unless he is the owner of such building. No such employee shall engage in any work which is inconsistent with his duties or with the interests of the Office of Building Inspections.

1-2.7 Qualifications of the Building Official

The building official shall have at least 10 years experience or equivalent, as an architect, engineer, inspector, contractor, or superintendent of construction or any combination of these, five years of which shall have been in supervisory experience. The building official should be certified through a recognized certification program and registered with the State. The Building Official shall be appointed or hired by the applicable governing authority.



Section 1-3 Powers and Duties of the Building Official

1-3.1 Right of Entry

Where it is necessary to make an inspection to enforce the provisions of this code, or where the Building Official has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the Building Official is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the Building Official shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the Building Official shall have recourse to the remedies provided by law to secure entry.

1-3.2 Stop Work Orders

Whenever the Building Official finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the Building Official is authorized to issue a stop work order. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume. Any person who shall continue to work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by law.

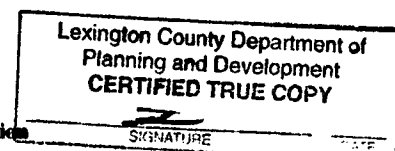
1-3.3 Revocation of Permits

The Building Official may revoke a permit or approval, issued under the provisions of this Ordinance, in case there was any false statement or misrepresentation as to a material fact in the application or plans on which the permit or approval was based. In all cases, no permit fee shall be refunded.

1-3.4 Requirements Not Covered by Ordinance

Any requirement necessary for the safety, strength, or stability of an existing or proposed building, structure or installation, or for the safety of the occupants of a building or structure, not specifically covered by this Ordinance, shall be determined by the Building Official subject to appeal to the Board of Appeals.

1-3.5 Alternate Materials and Alternate Methods of Construction



The provisions of this code are not intended to prevent the installation of material or to prohibit any design or method of construction not specifically prescribed by this code, provided that such alternative has been approved. An alternate design, material or method shall be approved where the Building Official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the Building Official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the Building Official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the Building Official for the period required for retention of public records.

1-3.6 Liability

The Building Official, member of the Board of Appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent laws or ordinance, shall not thereby be rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties. Any suit instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final determination of the proceedings. The Building Official or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

1-3.7 Unsafe Buildings

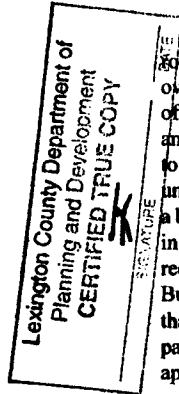
a. Authority

Whenever the Building Official or his designated representative finds that there exists in the county dwellings or buildings which are unfit for human habitation and/or other use due to dilapidation, defects increasing the hazards of fires, accidents or other calamities, lack of ventilation, light or sanitary facilities, or other conditions rendering such dwellings or buildings unsafe or unsanitary, dangerous or detrimental to the health, safety or morals or otherwise inimical to the welfare of the residents or Lexington County, the Building Official or his designated representative(s) may, upon the approval of a majority of the members of Council, exercise the County's police powers to repair, close or demolish any such dwelling or building.

b. Filing of Complaint and Investigation

That whenever a complaint or petition is filed with the Building Official, or his designated representative(s), by any one of the administrative heads of the County departments which





...continually deal with areas relevant to this statute, or by at least five (5) residents or property owners of the County who have some portion of their property within 2,000 feet of some portion of the property upon which the dwelling or building or other structure is located, charging that any dwelling or building or other structure is unfit for human habitation, or whenever it appears to the Building Official (on his own motion) that any dwelling or building or other structure is unfit for human habitation, the Building Official shall, if his preliminary investigation discloses a basis for such charges, issue and cause to be served upon the owner of and all parties in interest in such dwelling or building or other structure, a complaint and notice in letter form (return receipt requested) stating the charges in that respect and that a hearing will be held before the Building Official or his designate representative(s) not less than ten (10) calendar days nor more than thirty (30) calendar days after the service of such complaint or letter, that the owner and parties in interest shall be give the right to file an answer to the complaint in letter form and to appear in person or otherwise and given testimony at the place and time fixed in the complaint, and that the rules of evidence prevailing in the courts of law or equity shall not be controlling in such hearings.

c. Notice to Owner and Necessary Action by Owner

That if, after such notice and hearing, the Building Official or his designated representative(s) determines that a dwelling or building or other structure under consideration is unfit for human habitation, it shall be stated in writing, such writing to include the findings of fact in support of such determination, and this writing shall be issued and caused to be served upon the owner of such property together with or in the form of a notice.

- (1) If the repair, alteration or improvement of the dwelling or building or other structure can be made at a reasonable cost in relation to the value of the dwelling or building or other structure, the owner shall be required within the time specified in such order, to repair, alter or improve such dwelling or building or other structure to render it fit for human habitation; or
- (2) If the repair, alteration or improvement of the dwelling or building or other structure cannot be made at a reasonable cost in relation to the value of the dwelling or building or other structure, the owner shall be required, within the time specified in the order, to remove or demolish such dwelling or building.

d. Failure to Comply

If the owner fails to comply with the order to repair, alter or improve or remove and demolish, the Building Official, or his designated representative(s), may cause such dwelling or building or other structure to be repaired, altered or improved, or removed or demolished. Such failure to comply shall also constitute a violation of this Ordinance and may be punishable as outlined in section 1-12 of this Ordinance.

e. Costs

The amount of the cost of such repairs, alterations or improvements, or removal or demolition by the County of Lexington shall be a lien against the real property placed and collected through appropriate judicial process.

f. Unfitness

A dwelling or building or other structure is unfit for human habitation if conditions exist in such dwelling or building or other structure which are dangerous or injurious to health or safety of the

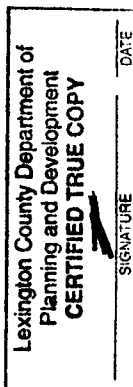
occupants of such dwelling, building or other structure, the occupants of neighboring dwellings or building or other structures, or other residents of the County. Such conditions may include the following, without limiting the generality of the foregoing: defects therein increasing the hazards of fire, accidents, or other calamities, lack of adequate ventilation, light or sanitary facilities, dilapidation, disrepair, structural defects, uncleanness, and any other conditions in a reasonable way relating to unfitness for human habitation as previously set forth.

g. Service of Complaint

Complaints by letter or orders hereunder shall be delivered to an/or served upon such persons either personally or by registered mail (return receipt requested), but if the whereabouts of such persons are unknown and cannot be ascertained in the exercise of reasonable diligence, the Building Official or his designated representative(s) shall make an affidavit to that effect, then the serving of such complaint or order upon such persons may be made by publishing it once each week for two (2) consecutive weeks in a newspaper printed and published in the county. A copy of such complaint or order shall be posted in a conspicuous place on the premises affected by the complaint or order. A copy of such complaint or order shall also be filed with the Lexington County Clerk of Court, and such filing of the complaint or order shall have the same force and effect as other lis pendens notices provided by law.

h. Rights of Persons Affected by Orders

Any person affected by an order issued by the Building Official or his designated representative(s) may within sixty (60) days after the posting and service of the order, petition the circuit court for an injunction restraining the Building Official or his designated representative(s) from carrying out the provisions of the order, and the court may, upon such petition, issue a temporary injunction restraining the public officer pending the final disposition of the cause. Hearings shall be had by the court on such petitions within twenty (20) days or as soon thereafter as possible and shall be given preference over other matters on the court's calendar as authorized by §32-15-370 of the Code of Laws of South Carolina, 1976, as amended. The Court shall hear and determine the issues raised and shall enter such final order or decree as law and justice may require. In all such proceedings, the findings of the public officer as to the facts, if supported by evidence, shall be conclusive. Costs shall be at the discretion of the court. The remedies herein provided shall be exclusive remedies, and no person affected by an order of the public officer shall be entitled to recover any damages for action taken pursuant to any order of the Building Official or his designated representative(s) or because of compliance by such person with any order of the public officer.



1. To investigate the dwelling or building or other structure conditions in the county in order to determine which dwellings or buildings or other structures therein are unfit for human habitation;
2. To administer oaths and affirmations, examine witnesses and receive evidence;
3. To enter upon premises for the purposes of making examination, provided such entries be made in such manner as to cause the least possible inconvenience to the person in possession;
4. To appoint and fix the duties of such officers, agents, and employees as he deems necessary to carry out the purposes of the ordinance; and

5. To delegate any of his functions and powers under this ordinance to such officers and agents as he may choose.

1-3.8 Records and Reports

The Building Official shall maintain records of building permit applications, of permits issued, or certificates issued, of all inspections made, of reports rendered, and of notices or orders issued. He shall keep on file copies of all documents relating to building work for the period required for retention of public records. All records of the Office of Building Inspections shall be open to public inspection during stated office hours, but shall not be removed from the Office of Building Inspections without the written consent of the Building Official. He shall submit written reports covering the activities of the Department of Inspections at the request of the County Administrator. The Building Official shall include in his activity report a summary of the decisions of the Building Codes Board of Appeals. He shall, at all times, keep the County Administrator informed of any controversial or conflicting situations which could jeopardize the efficient and consistent functioning of the Department of Inspections.

1-3.9 Cooperation of Other Officials

The Building Official may request and shall receive so far as may be necessary, in the discharge of his duties, the assistance and cooperation of other officials of the County.



Section 1-4 Application for Permit

1-4.1 When Required

- a. Any owner, authorized agent or contractor who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this Ordinance, or to cause any such work to be done, shall first make application to the Building Official and obtain the required permit. A permit to install a manufactured home is required regardless of the cost of installation. One copy of the required permit shall be forwarded to the County Auditors.
- b. Nothing contained herein shall require any public utility company to obtain a permit for work performed in its respective field.

1-4.1.1 Work exempt from permit

- A. Ordinary repairs and maintenance.
- B. Fences.
- C. Retaining walls unless supporting a surcharge.
- D. Water tanks.
- E. Sidewalks, driveways and patios.
- F. Painting, papering, tiling, carpeting, cabinets and similar cosmetic finish type work.
- G. Swimming pools accessory to a one or two family dwelling.
- H. Swings and other playground equipment accessory to a one or two family dwelling.
- I. One-story detached storage structures accessory to a one or two family dwelling, provided that the floor area does not exceed 500 square feet.
- J. Shade cloth structures constructed for nursery or agricultural purposes and not including service systems.
- K. Window awnings supported by an exterior wall.
- L. Movable cases, counters and partitions not over 5 feet 9 inches in height.



1-4.2 Form

Application for a permit shall be made on the form provided by the Building Official. The applicant shall furnish information as may be required to complete the application.

1-4.3 Plans and Specifications

When required by the Building Official, two or more copies of the specifications and drawings shall accompany every application. The Building Official may require details, computations, diagrams and other data necessary to describe the construction or installation and basis of calculations and they shall bear the signature of the person responsible for the design.

1-4.4 Plat Diagram

The Building Official shall require a plat diagram to be submitted with the application for a permit. When deemed necessary by the Building Official this diagram shall show, but not be limited to, the following:

- a. Location of the proposed building or structure and of every existing building or structure on the site or lot.
- b. The location of such proposed building or structure with respect to the property lines of said site or lot.
- c. Any access or right of way of any street adjoining said site or lot.
- d. Size, shape, height, and use of existing or any proposed structures.
- e. When required, a plat with metes and bounds description of the site or lot prepared by a certified Land Surveyor.

1-4.5 Flood Plain Areas

- a. The Building Official shall not issue a permit for any construction on lands that are deemed to be situated within a flood plain area. Such flood plain areas shall be defined as the geographical area within the flow line of a standard projected flood as defined by the Corps of Engineers or such areas that are known to be hazardous due to various geographical conditions, such as constant wetness, soil erosion, mud slides, sink areas, and etc.
- b. It shall be the responsibility of the applicant to provide ample information indicating that the requested permit area does not fall within the above defined area.

1-4.6 When Zoning Permits Required

If proposed construction, for which a building permit is applied for, is to be done in an area of Lexington County which is subject to zoning regulations as enacted by Lexington County, then the applicant must also submit to the Building Official a valid zoning permit for said construction as issued by the Zoning Administrator of Lexington County. The zoning permit must be submitted to the applicant to the Building Official along with this application for a building permit. If the requirements of this Section have not been fully complied with, the Building Official shall not issue the building permit.

1-4.7 When Subdivision Regulations Are Applicable



If proposed construction, for which a building permit is applied for, is to be done in an area which is subject to subdivision regulations as enacted by Lexington County, then the Building Official shall issue a building permit only if said construction is in compliance with the Subdivision Regulations of Lexington County

1-4.8 Water and Sewer Approval Required

When required by the Building Official, an applicant for a building permit must submit to the Building Official a certificate issued by the appropriate authority granting approval for water and sewer facilities.

1-4.9 Examination of Application

- a. The Building Official shall examine or cause to be examined each application for a permit, the drawings and specifications and all other data filed therewith. If the application together with all supporting data conform to the requirements of this Ordinance and other pertinent laws and ordinances, then he shall issue a permit therefore to the applicant upon payment of the required fee as provided in Section 1-6.
- b. If the application for a permit and the supporting data filed therewith describe work which does not conform to the requirements of this Ordinance or other pertinent laws or ordinances, the Building Official shall not issue a permit, but shall return the drawings to the applicant with his refusal to issue such a permit. Such refusal, when requested, shall be in writing and shall contain the reasons therefore, the applicant may appeal the decision of the Building Official to the Building Codes Board of Appeals as provided in Section 1-11.
- c. The Building Official may accept an affidavit from a registered architect or engineer stating that the plans submitted conform to the technical codes. For buildings and structures, the affidavit shall state that the plans conform to the laws as to egress, type of construction and general arrangement and, if accompanied by drawings, show the structural design and that the plans and design conform to the requirements of the technical codes as to strength, stresses, strains, loads and stability. The Building Official may without any examination or inspection accept such affidavit. Where the Building Official accepts such an affidavit in lieu of performing a plan review, the architect or engineer shall assume full responsibility for the design's compliance with all provisions of the technical codes and other pertinent laws or ordinances.



Section 1-5 Permit

1-5.1 Conditions of Permit

The Building Official shall act upon an application for a permit without unreasonable or unnecessary delay. A permit issued shall be construed to be a license to proceed with the work and shall not be construed as authority to violate, conceal, alter, or set aside any of the provisions of the Ordinance, nor shall such issuance of a permit prevent the Building Official from thereafter requiring correction of errors in plans or in construction, or of violations of this Ordinance. Any permit issued shall become invalid unless the work authorized by it was commenced within six (6) months after its issuance, or if the work authorized by such permit is suspended or abandoned for a period of one (1) year after the time the work is commenced; provided, that for cause, one or more extensions of time for periods not exceeding ninety (90) days each, may be allowed in writing by the Building Official.

1-5.2 Notification of Quitting Required

- a. Should any person to whom a permit was issued quit the construction or installation for any reason, he shall notify the Building Official and state the reason. If the construction or installation was partially completed, the person to whom the permit was issued, upon quitting the installation, shall notify the Building Official and request an inspection. Acceptance of, or violations against the work shall be recorded by the inspector or the permit record. No refund of the permit shall be granted to the person to whom the permit was issued.
- b. If the holder of a permit quits an installation and fails to notify the Building Official, the owner or his agent may notify the Building Official and request inspection. Upon inspection the holder of the permit shall be sent a notice of any violation. The owner may then secure another qualified person to proceed with the work.
- c. If no work was done, the holder of the permit shall be entitled to a refund on his permit, provided, however, that a minimum charge shall be made.

1-5.3 Posting of Permit

Work requiring a building permit shall not be commenced until the permit holder or his agent shall have the building permit card in a conspicuous place on the front of the premises. The permit shall be protected from the weather and in such position as to permit the Building Official to conveniently make the required entries thereon. This permit card shall be maintained in such position by the permit holder until the Certificate of Occupancy is issued by the Building Official.



Section 1-6 Fees

1-6.1 General

No permit shall be issued until the required fees are paid. Nor shall an amendment to a permit be approved until the additional fee, if any, due to any increase in the estimated cost of the building, or structure, is paid.

1-6.2 Schedule of Fees

The schedule for all fees and permits shall be established by Lexington County Council.

1-6.3 No Charge Permit

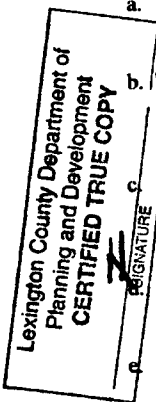
At the discretion of the Building Official, he may waive the required permit fee on any community or charitable project for which all labor, materials and profit are donated. The Building Official shall notify the County Administrator in writing of all such projects.



Section 1-7 Inspections

1-7.1 Inspections Required

The Building Official shall inspect or cause to be inspected at various intervals all construction, installations or work for compliance to the provisions of this Ordinance. The results of any inspection performed shall not be construed as an approval of a violation of the provision of this Ordinance or of any other ordinances of this jurisdiction. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes.

- 
- a. Footing - The footing inspection shall be made after excavations are complete and prior to the placement of concrete.
 - b. Concrete Slab or Under Floor Inspection - To be made after in slab or under floor reinforcing steel and building service equipment, conduit, piping accessories and other ancillary equipment items are in place but before any concrete is placed.
 - c. Rough-In - To be made after the roof deck, framing, fire blocking and bracing are in place and pipes, chimneys and vents to be concealed are completed and the rough electrical, plumbing, heating and ducts are approved.
 - d. Fire Resistant Penetrations - Protection of joists, partitions, structural members and penetrations in fire resistant rated assemblies shall not be concealed from view until inspected.
 - e. Other Inspections - In addition to the inspections specified above, the Building Official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code.
 - f. Final - The final inspection shall be made after all work authorized by the building permit is complete.

1-7.1.1 Inspection Agencies

The Building Official is authorized to accept reports of approved inspection agencies provided such agencies satisfy the requirements as to qualifications.

1-7.2 Notification

- a. Advance Notice - It shall be the duty of the permit holder to give reasonable advance notice to the Building Official when work is ready for inspection and testing. A log of all telephone calls or other requests for inspections shall be kept by the Building Official so that a permanent record can be had of the time and date when such requests for inspections were made.
- b. Contractor's Responsibility - It shall be the duty of the permit holder to ensure that the work will meet the required inspections or test before giving the Advance Notice.

1-7.3 Results of Inspection

The Building Official, upon notification, shall make the requested inspections and notify the permit holder or his agent as to the results of the inspection. If any portion of the work does not substantially comply with the requirements of this Ordinance a re-inspection will be required before such portion is covered or concealed.

1-7.4 Re-Inspections

When re-inspections are made necessary for reasons of non-compliance or otherwise through fault or error on the part of the permit holder, or on part of his employees, after the notice has been given in writing by the Building Official setting forth the violation; then the permit holder shall pay the established fees for the additional required inspection or inspections.



Section 1-8 Certificate of Occupancy

1-8.1 Use and Occupancy

No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the Building Official has issued a certificate of occupancy. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of this code or of other ordinances of the jurisdiction.

1-8.2 Changes in Use

Changes in the character or use of an existing structure shall not be made except as specified in Chapter 34 of the 2000 International Building Code.

1-8.3 Certificate Issued

After the Building Official inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the Office of Building Inspections and after all required fees have been paid, the Building Official shall issue a certificate of occupancy.

1-8.4 Temporary Certificate of Occupancy

The Building Official is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that such portion or portions shall be occupied safely. The Building Official shall set a time period during which the temporary certificate of occupancy is valid.

1-8.5 Revocation

The Building Official is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.



Section 1-9 Building Codes Board of Appeals

1-9.1 Establishment

The Building Codes Board of Appeals is hereby established and shall consist of nine (9) members. The board shall consist of at least one (1) architect, one (1) engineer, one (1) general contractor, one (1) residential builder, one (1) member at large and one (1) member each from the building, electrical, mechanical and plumbing industries. All members shall be residents of the County. All members shall be appointed by the County Council and serve without compensation. The Building Official shall be an ex officio member of said board but shall have no vote on any matter before the board. The board shall annually select one of its members to serve as chairperson.

1-9.2 Term of Office

Of the members first appointed: two (2) shall be appointed for two (2) year terms; two (2) shall be appointed for three (3) year terms; and three (3) shall be appointed for four (4) year terms. Thereafter, members shall be appointed four (4) year terms. Vacancies shall be filled for an unexpired term in the manner in which original appointments are required to be made.

1-9.3 Postponed Hearing

When five members are not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing. A member shall not hear an appeal in which that member has a personal, professional or financial interest.

1-9.4 Records

The Building Official shall designate a qualified clerk to serve as secretary to the board who shall make a detailed record of all its proceedings, which shall set forth the reasons for its decisions, the vote of each member participating therein, the absence of a member, and any failure of a member to vote.

1-9.5 Procedures

The Board shall establish rules and regulations for its own procedures not inconsistent with the provisions of this Ordinance. The board shall meet upon notice from the chairperson, within ten days of the filing of an appeal or at stated periodic meetings.



Section 1-10 Decisions of the Building Codes Board of Appeals

1-10.1 Variations and Modifications

- a. The Board of Appeals, when so appealed to and after a hearing, may vary the application of any provision of this Ordinance to any particular case when, in its opinion, the enforcement thereof would do manifest injustice, and would be contrary to the spirit and purpose of this Ordinance or public interest, or when, in its opinion the interpretation of the Building Official should be modified or reversed.
- b. Notice of appeal shall be in writing and filed within thirty (30) days after the decision is rendered by the Building Official.
- c. In the case of a building, structure or installation which, in the opinion of the Building Official, is unsafe or dangerous, the Building Official may on his order limit the time for such appeal to a shorter period.
- d. A decision of the Board of Appeals to vary the application of any provision of this Ordinance or to modify an order of the Building Official shall specify in what manner such variation or modification is made, the conditions upon which it is made and the reasons therefore.

1-10.2 Decisions

- a. Every decision of the Board of Appeals shall be final, subject, however, to such remedy as any aggrieved party might have at law or in equity. It shall be in writing and shall indicate the vote upon the decision. Every decision shall be promptly filed in the Office of the Building Official, and shall be open to public inspection; a certified copy shall be sent by mail or otherwise to the appellant.
- b. The Board of Appeals shall, in every case, reach a decision without unreasonable or unnecessary delay.
- c. If a decision of the Board of Adjustment reverses or modifies a refusal, order, or disallowance of the Building Official, or varies the application of any provision of this Ordinance, the Building Official shall immediately take action in accordance with such decision.



Section 1-11 Violations and Penalties

- 1-11.1 a.** The violation of any provisions of this Ordinance shall constitute a misdemeanor as provided in Section 7 of Act No. 1415 of the Acts and Joint Resolutions of the General Assembly of the State of South Carolina, 1972, and any person, firm, corporation or agent who shall commence construction on a building or structure before obtaining the necessary building permit as required by this Ordinance or who shall otherwise violate any provision of this Ordinance shall, upon conviction, be punished by a fine not to exceed one hundred (\$100) dollars or imprisonment of not more than thirty (30) days. Each day such violation shall continue shall be deemed a separate offense; all of which is set out in Section 7 of Act No. 1415 for 1972 as herein referred to.
- b.** In the event of any violation or proposed violation of this Ordinance, the Building Official, or other appropriate authority of Lexington County, or any adjacent or neighboring property owner who would be damaged by such violation, as provided in Section 8 of Act No. 1415 of the Acts and Joint Resolutions of the General Assembly of the State of South Carolina, 1972, in addition to other remedies, may apply to a court of competent jurisdiction for injunctive relief, mandamus, or other appropriate proceeding to prevent, correct or abate such violation or threatened violation.



ARTICLE 2 - BUILDING CODE

Section 2-1 Purpose

Provide for regulating the construction, alterations, repairs, equipment, use and occupation, location, maintenance, removal and demolition, of every building or structure or any appurtenance connected or attached to such building or structure.

Section 2-2 Minimum Standards

Except as amended, the construction, alteration, change of occupancy, repair and demolition of every building or structure shall conform to the International Building Code, 2000 edition, excluding Chapter 1.

Section 2-3 Minimum Standards

Except as amended, the construction, alteration, change of occupancy, repair and demolition of every detached one and two family residential building and accessory structures shall conform to the International Residential Code for One and Two Family Dwellings, 2000 edition, excluding Chapter 1.



ARTICLE 3 - ELECTRICAL CODE

Section 3-1 Purpose

Provides for the installation, alteration, and maintenance of all electrical installations.

Section 3-2 Minimum Standards

Except as amended, the installation, workmanship, construction, maintenance or repair of all electrical work/devices shall conform to requirements set forth in the National Electrical Code, 2002 edition, as promulgated by the National Fire Protection Association.

Section 3-3 Electricity Not To Be Furnished Without Permit

It shall be unlawful for any public utility company or rural electric cooperative to make a new connection of electrical energy to a building, mobile home or structure requiring a permit unless said structure shall have acquired the necessary building or mobile home permit from the Department of Inspections.



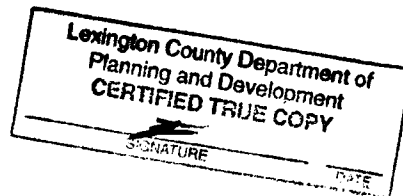
ARTICLE 4 - GAS CODE

Section 4-1 Purpose

Provides for regulating the installation, alteration, and maintenance of all piping extending from the point of delivery of gas for use as a fuel and designated to convey or carry the same gas appliances, and regulating the installation and maintenance of appliances designated to utilize such gas as a fuel.

Section 4-2 Minimum Standards

Except as amended, the installation, workmanship, construction, maintenance or repair of all gas appliances and equipment shall conform to the International Fuel Gas Code, 2000 edition excluding Chapter 1.



ARTICLE 5 - PLUMBING CODE

Section 5-1 Purpose

Provides for regulating the installation, alteration, and maintenance of all plumbing and other related appurtenances.

Section 5-2 Minimum Standards

Except as amended, the installation, workmanship, construction, maintenance or repair of all plumbing work/fixtures shall conform to the International Plumbing Code, 2000 edition, excluding Chapter 1.



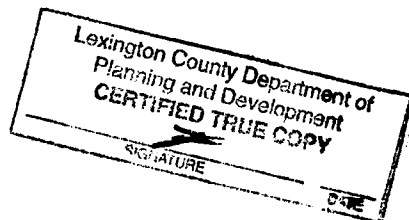
ARTICLE 6 - MECHANICAL CODE

Section 6-1 Purpose

Provides for regulating the installation, alteration, and maintenance of all mechanical installation and other related apparatus.

Section 6-2 Minimum Standards

Except as amended, the installation, workmanship, maintenance or repair of all mechanical work/devices shall conform to the International Mechanical Code, 2000 edition, excluding Chapter 1.



ARTICLE 7 - MANUFACTURED HOMES

7-1 Manufactured Home Inspections

One inspection will be performed by Lexington County. The inspection is to be scheduled after the manufactured home has been placed on site and connected to a septic tank or sewer system, all electrical work and mechanical appurtenances are completed and ready to be energized by the utility supplier, a current Lexington County Mobile Home Tax Sticker has been displayed, the address has been appropriately posted, and all provision of this article have been installed. If all items are approved, a utility release will be forwarded to the utility supplier.

7-2 Steps, Landings, and Railings

Manufactured homes shall be equipped with steps, landings, and railings as prescribed in this Ordinance.

7-3 Foundations, Anchoring Systems and Tiedowns

Manufactured homes with provisions for installation of the foundation, anchoring systems and tiedowns, including instructions, which are in accordance with the Federal Manufactured Home Construction and Safety Standards, shall be installed in accordance with those specifications and instructions. Manufactured homes not provided with such installation specifications and instructions, or homes where such specifications and instructions are not obtainable, shall have foundations, anchoring systems and tiedowns constructed according to Appendix H of the Standard Building Code, with the exception of any reference to over-the-roof tiedowns.

7-4 Underpinning

After July 1, 1996

Manufactured homes must be underpinned with masonry, mobile home skirting, or other material approved by the Building Official. Underpinning shall be installed in accordance with the installation specifications and instructions of the particular manufactured home, or the specifications and instructions of the mobile home skirting manufacturer, or the applicable section of the Standard Building Code for the material involved.

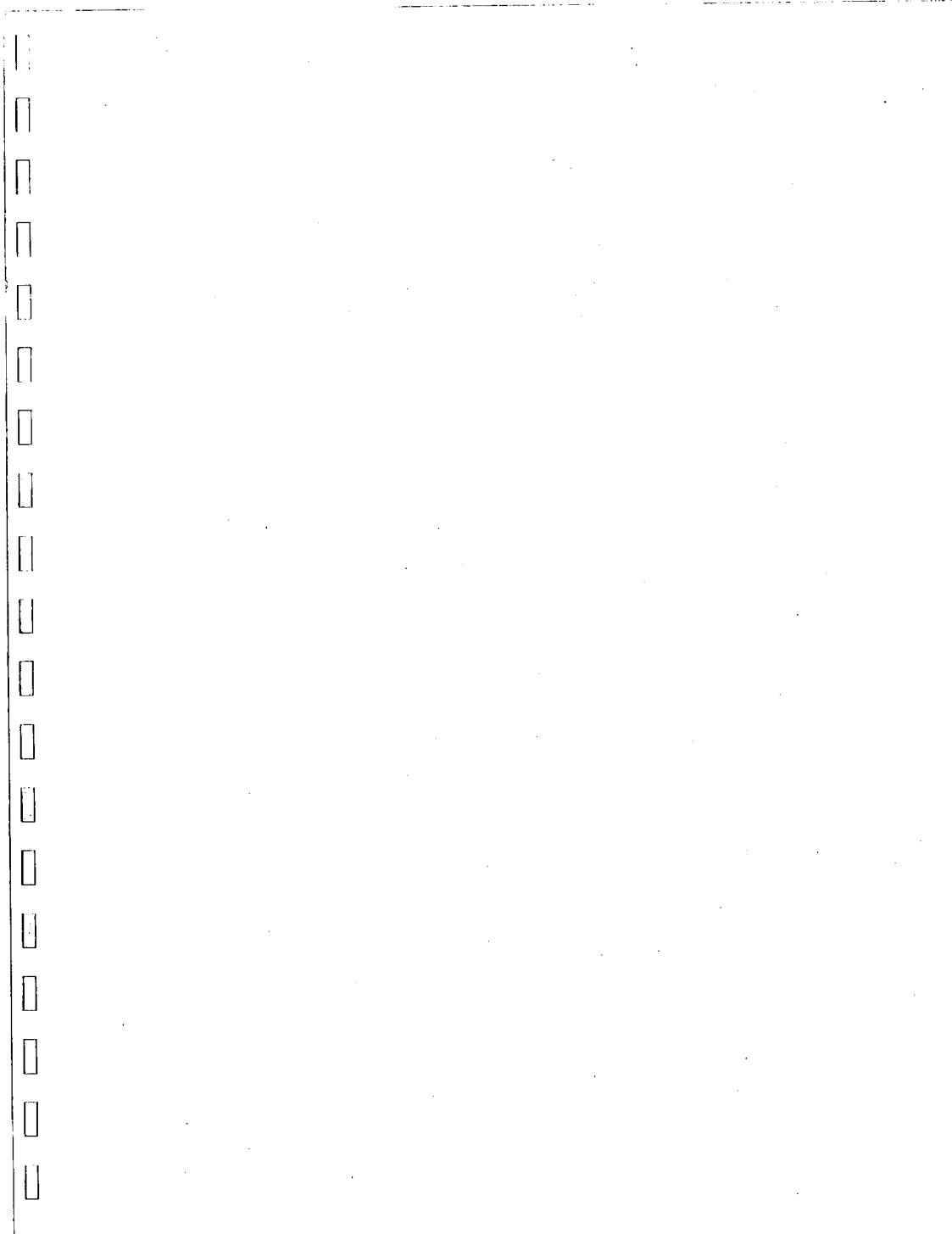
Access to and ventilation of these enclosed underfloor areas shall be in accordance with the specifications of the manufactured home. If such specifications are not obtainable, the requirements of the 1994 Standard Building Code shall be followed.

7-5 Date of Construction

Manufactured homes manufactured before June 15, 1976 shall not be considered in compliance with the minimum construction standards established by this ordinance. Such homes may not be established as new residences with existing homes allowed to continue to be occupied at their current location only.



ARTICLE 8 - FIRE CODE



CHAPTER 6

WATER SUPPLY AND DISTRIBUTION

SECTION 601
GENERAL

601.1 Scope. This chapter shall govern the materials, design and installation of water supply systems, both hot and cold, for utilization in connection with human occupancy and habitation and shall govern the installation of individual water supply systems.

601.2 Solar energy utilization. Solar energy systems used for heating potable water or using an independent medium for heating potable water shall comply with the applicable requirements of this code. The use of solar energy shall not compromise the requirements for cross connection or protection of the potable water supply system required by this code.

601.3 Existing piping used for grounding. Existing metallic water service piping used for electrical grounding shall not be replaced with nonmetallic pipe or tubing until other approved means of grounding are provided.

601.4 Tests. The potable water distribution system shall be tested in accordance with Section 312.5.

SECTION 602
WATER REQUIRED

602.1 General. Every structure equipped with plumbing fixtures and utilized for human occupancy or habitation shall be provided with a potable supply of water in the amounts and at the pressures specified in this chapter.

602.2 Potable water required. Only potable water shall be supplied to plumbing fixtures that provide water for drinking, bathing or culinary purposes, or for the processing of food, medical or pharmaceutical products. Unless otherwise provided in this code, potable water shall be supplied to all plumbing fixtures.

602.3 Individual water supply. Where a potable public water supply is not available, individual sources of potable water supply shall be utilized.

602.3.1 Sources. Dependent on geological and soil conditions and the amount of rainfall, individual water supplies are of the following types: drilled well, driven well, dug well, bored well, spring, stream or cistern. Surface bodies of water and land cisterns shall not be sources of individual water supply unless properly treated by approved means to prevent contamination.

602.3.2 Minimum quantity. The combined capacity of the source and storage in an individual water supply system shall supply the fixtures with water at rates and pressures as required by this chapter.

602.3.3 Water quality. Water from an individual water supply shall be approved as potable by the authority having jurisdiction prior to connection to the plumbing system.

602.3.4 Disinfection of system. After construction or major repair, the individual water supply system shall be purged of deleterious matter and disinfected in accordance with Section 610.

602.3.5 Pumps. Pumps shall be rated for the transport of potable water. Pumps in an individual water supply system shall be constructed and installed so as to prevent contamination from entering a potable water supply through the pump units. Pumps shall be sealed to the well casing or covered with a water-tight seal. Pumps shall be designed to maintain a prime and installed such that ready access is provided to the pump parts of the entire assembly for repairs.

602.3.5.1 Pump enclosure. The pump room or enclosure around a well pump shall be drained and protected from freezing by heating or other approved means. Where pumps are installed in basements, such pumps shall be mounted on a block or shelf not less than 18 inches (457 mm) above the basement floor. Well pits shall be prohibited.

SECTION 603
WATER SERVICE

603.1 Size of water service pipe. The water service pipe shall be sized to supply water to the structure in the quantities and at the pressures required in this code. The minimum diameter of water service pipe shall be $\frac{3}{4}$ inch (19.1 mm).

603.2 Separation of water service and building drain/sewer. Water service pipe and the building drain/sewer shall be separated by 5 feet (1524 mm) of undisturbed or compacted earth.

Exception: The required separation distance shall not apply where the bottom of the water service pipe within 5 feet (1524 mm) of the building drain/sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the building drain/sewer and the pipe materials conform to Section 702.2 or Section 702.3.

603.2.1 Water service near sources of pollution. Potable water service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits (see Section 605.2 for soil and groundwater conditions).

SECTION 604
DESIGN OF BUILDING WATER
DISTRIBUTION SYSTEM

604.1 General. The design of the water distribution system shall conform to accepted engineering practice. Methods utilized to determine pipe sizes shall be approved.

604.2 - 604.8.1

WATER SUPPLY AND DISTRIBUTION

604.2 System interconnection. At the points of interconnection between the hot and cold water supply piping systems and the individual fixtures, appliances or devices, provisions shall be made to prevent flow between such piping systems.

604.3 Water distribution system design criteria. The water distribution system shall be designed, and pipe sizes shall be selected such that under conditions of peak demand, the capacities at the fixture supply pipe outlets shall not be less than shown in Table 604.3. The minimum flow rate and flow pressure provided to fixtures and appliances not listed in Table 604.3 shall be in accordance with manufacturer's installation instructions.

TABLE 604.3
WATER DISTRIBUTION SYSTEM DESIGN CRITERIA
REQUIRED CAPACITIES AT FIXTURE SUPPLY PIPE OUTLETS

FIXTURE SUPPLY OUTLET SERVING	FLOW RATE ^a (gpm)	FLOW PRESSURE (psi)
Bathtub	4	8
Bidet	2	4
Combination fixture	4	8
Dishwasher, residential	2.75	8
Drinking fountain	0.75	8
Laundry tray	4	8
Lavatory	2	8
Shower	3	8
Shower, temperature controlled	3	20
Sillcock, hose bibb	5	8
Sink, residential	2.5	8
Sink, service	3	8
Urinal, valve	15	15
Water closet, blow out, flushometer valve	35	25
Water closet, flushometer tank	1.6	15
Water closet, siphonic, flushometer valve	25	15
Water closet, tank, close coupled	3	8
Water closet, tank, one piece	6	20

For SI: 1 psi = 6.895 kPa, 1 gallon per minute (gpm) = 3.785 L/m.

a. For additional requirements for flow rates and quantities, see Section 604.4.

604.4 Maximum flow and water consumption. The maximum water consumption flow rates and quantities for all plumbing fixtures and fixture fittings shall be in accordance with Table 604.4.

Exceptions:

1. Blowout design water closets [3.5 gallons (13 L) per flushing cycle].
2. Vegetable sprays.
3. Clinical sinks [4.5 gallons (17 L) per flushing cycle].
4. Service sinks.
5. Emergency showers.

TABLE 604.4
MAXIMUM FLOW RATES AND CONSUMPTION
FOR PLUMBING FIXTURES AND FIXTURE FITTINGS

PLUMBING FIXTURE OR FIXTURE FITTING	MAXIMUM FLOW RATE OR QUANTITY ^a
Water closet	1.6 gallons per flushing cycle
Urinal	1.0 gallon per flushing cycle
Shower head ^a	2.5 gpm at 60 psi
Lavatory, private	2.2 gpm at 60 psi
Lavatory (other than metering), public	0.5 gpm at 60 psi
Lavatory, public (metering)	0.25 gallon per metering cycle
Sink faucet	2.2 gpm at 60 psi

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 psi = 6.895 kPa.

a. A hand-held shower spray is a shower head.

b. Consumption tolerances shall be determined from referenced standards.

604.5 Size of fixture supply. The minimum size of a fixture supply pipe shall be as shown in Table 604.5. The fixture supply pipe shall not terminate more than 30 inches (762 mm) from the point of connection to the fixture. A reduced-size flexible connector installed between the supply pipe and the fixture shall be of an approved type. The supply pipe shall extend to the floor or wall adjacent to the fixture. The minimum size of individual distribution lines utilized in parallel water distribution systems shall be as shown in Table 604.5.

604.6 Variable street pressures. Where street water main pressures fluctuate, the building water distribution system shall be designed for the minimum pressure available.

604.7 Inadequate water pressure. Wherever water pressure from the street main or other source of supply is insufficient to provide flow pressures at fixture outlets as required under Section 604.3, a water pressure booster system conforming to Section 606.5, shall be installed on the building water supply system.

604.8 Water-pressure reducing valve or regulator. Where water pressure within a building exceeds 80 psi (552 kPa) static, an approved water-pressure reducing valve conforming to ASSE 1003 with strainer shall be installed to reduce the pressure in the building water distribution piping to 80 psi (552 kPa) static or less.

Exception: Service lines to sill cocks and outside hydrants, and main supply risers where pressure from the mains is reduced to 80 psi (552 kPa) or less at individual fixtures.

604.8.1 Valve design. The pressure-reducing valve shall be designed to remain open to permit uninterrupted water flow in case of valve failure.

WATER SUPPLY AND DISTRIBUTION

TABLE 604.5 - 605.4

TABLE 604.5
MINIMUM SIZES OF FIXTURE WATER SUPPLY PIPES

FIXTURE	MINIMUM PIPE SIZE (inch)
Bathtubs (60" x 32" and smaller) ^a	1/2
Bathtubs (larger than 60" x 32")	1/2
Bidet	3/8
Combination sink and tray	1/2
Dishwasher, domestic ^a	1/2
Drinking fountain	3/8
Hose bibbs	1/2
Kitchen sink ^a	1/2
Laundry, 1, 2 or 3 compartments ^a	1/2
Lavatory	3/8
Shower, single head ^a	1/2
Sinks, flushing rim	3/4
Sinks, service	1/2
Urinal, flush tank	1/2
Urinal, flush valve	3/4
Wall hydrant	1/2
Water closet, flush tank	3/8
Water closet, flush valve	1
Water closet, flushometer tank	3/8
Water closet, one piece ^a	1/2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psi = 6.895 kPa.

a. Where the developed length of the distribution line is 60 feet or less, and the available pressure at the meter is a minimum of 35 psi, the minimum size of an individual distribution line supplied from a manifold and installed as part of a parallel water distribution system shall be one nominal tube size smaller than the sizes indicated.

604.8.2 Repair and removal. All water-pressure reducing valves, regulators and strainers shall be so constructed and installed as to permit repair or removal of parts without breaking a pipeline or removing the valve and strainer from the pipeline.

604.9 Water hammer. The flow velocity of the water distribution system shall be controlled to reduce the possibility of water hammer. A water-hammer arrestor shall be installed where quick-closing valves are utilized, unless otherwise approved. Water-hammer arrestors shall be installed in accordance with the manufacturer's specifications. Water-hammer arrestors shall conform to ASSE 1010.

604.10 Parallel water distribution system manifolds. Hot water and cold water manifolds installed with parallel connected individual distribution lines to each fixture or fixture fitting shall be designed in accordance with Sections 604.10.1 through 604.10.3.

604.10.1 Manifold sizing. Hot water and cold water manifolds shall be sized in accordance with Table 604.10.1. The total gallons per minute is the demand of all outlets supplied.

TABLE 604.10.1
MANIFOLD SIZING

NOMINAL SIZE INTERNAL DIAMETER (inches)	MAXIMUM DEMAND (gpm)	
	Velocity at 4 feet per second	Velocity at 8 feet per second
1/2	2	5
3/4	6	11
1	10	20
1 1/4	15	31
1 1/2	22	44

For SI: 1 inch = 25.4 mm, 1 gallon per minute = 3.785 L/m, 1 foot per second = 0.305 m/s.

604.10.2 Valves. Individual fixture shutoff valves installed at the manifold shall be identified as to the fixture being supplied.

604.10.3 Access. Access shall be provided to manifolds.

SECTION 605
MATERIALS, JOINTS AND CONNECTIONS

605.1 Water compatibility. Water service pipe and water distribution pipe shall be resistant to corrosive action and degrading action from the potable water supplied by the water purveyor or individual water supply system.

605.2 Soil and ground water. The installation of a water service pipe shall be prohibited in soil and ground water contaminated with solvents, fuels, organic compounds or other detrimental materials causing permeation, corrosion, degradation or structural failure of the piping material. Where detrimental conditions are suspected, a chemical analysis of the soil and ground water conditions shall be required to ascertain the acceptability of the water service material for the specific installation. Where detrimental conditions exist, approved alternative materials or routing shall be required.

605.3 Lead content of water supply pipe and fittings. Pipe and pipe fittings, including valves and faucets, utilized in the water supply system shall have a maximum of 8-percent lead content.

605.4 Water service pipe. Water service pipe shall conform to NSF 61 and shall conform to one of the standards listed in Table 605.4. All water service pipe or tubing, installed underground and outside of the structure, shall have a minimum working pressure rating of 160 psi (1100 kPa) at 73.4°F (23°C). Where the water pressure exceeds 160 psi (1100 kPa), piping material shall have a minimum rated working pressure equal to the highest available pressure. Plastic water service piping shall terminate within 5 feet (1524 mm) inside the point of entry into a building. All ductile iron water pipe shall be cement mortar lined in accordance with AWWA C104.

TABLE 605.4 - TABLE 605.5

WATER SUPPLY AND DISTRIBUTION

TABLE 605.4
WATER SERVICE PIPE

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic pipe	ASTM D 1527; ASTM D 2282
Asbestos-cement pipe	ASTM C 296
Brass pipe	ASTM B 43
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WK, L, WL, M or WM)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 447
Chlorinated polyvinyl chloride (CPVC) plastic pipe	ASTM D 2846; ASTM F 441; ASTM F 442; CSA B137.6
Ductile iron water pipe	AWWA C151; AWWA C115
Galvanized steel pipe	ASTM A 53
Polybutylene (PB) plastic pipe and tubing	ASTM D 2662; ASTM D 2666; ASTM D 3309; CSA B137.8
Polyethylene (PE) plastic pipe	ASTM D 2239; CSA CAN/CSA-B137.1
Polyethylene (PE) plastic tubing	ASTM D 2737; CSA B137.1
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 876; ASTM F 877; CSA CAN/CSA-B137.5
Cross-linked polyethylene/ aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1281; CSA CAN/CSA B137.10
Polyethylene/aluminum/ polyethylene (PE-AL-PE) pipe	ASTM F 1282; CSA CAN/CSA-B137.9
Polyvinyl chloride (PVC) plastic pipe	ASTM D 1785; ASTM D 2241; ASTM D 2672; CSA CAN/CSA-B137.3

605.4.1 Dual check-valve-type backflow preventer.

Where a dual check-valve-backflow preventer is installed on the water supply system, it shall comply with ASSE 1024.

605.5 Water distribution pipe. Water distribution pipe shall conform to NSF 61 and shall conform to one of the standards listed in Table 605.5. All hot water distribution pipe and tubing shall have a minimum pressure rating of 100 psi (690 kPa) at 180°F (82°C).

605.6 Fittings. Pipe fittings shall be approved for installation with the piping material installed and shall conform to the respective pipe standards or one of the standards listed in Table 605.6. All pipe fittings utilized in water supply systems shall also conform to NSF 61. The fittings shall not have ledges, shoulders or reductions capable of retarding or obstructing

flow in the piping. Ductile and gray iron pipe fittings shall be cement mortar lined in accordance with AWWA C104.

605.6.1 Mechanically formed tee fittings. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.

605.6.1.1 Full flow assurance. Branch tubes shall not restrict the flow in the run tube. A dimple/depth stop shall be formed in the branch tube to ensure that penetration into the collar is of the correct depth. For inspection purposes, a second dimple shall be placed 0.25 inch (6.4 mm) above the first dimple. Dimples shall be aligned with the tube run.

605.6.1.2 Brazed joints. Mechanically formed tee fittings shall be brazed in accordance with Section 605.14.1.

TABLE 605.5
WATER DISTRIBUTION PIPE

MATERIAL	STANDARD
Brass pipe	ASTM B 43
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WK, L, WL, M or WM)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 447
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 877; CSA CAN/CSA-B137.5
Cross-linked polyethylene/ aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1281; CSA CAN/CSA-B137.10
Galvanized steel pipe	ASTM A 53
Polybutylene (PB) plastic pipe and tubing	ASTM D 3309; CSA CAN3-B137.8

WATER SUPPLY AND DISTRIBUTION

TABLE 605.6 - 605.14.1

TABLE 605.6
PIPE FITTINGS

MATERIAL	STANDARD
Acrylonitrile butadiene styrene (ABS) plastic	ASTM D 2468
Cast iron	ASME B16.4; ASME B16.12
Chlorinated polyvinyl chloride (CPVC) plastic	ASTM F 437; ASTM F 438; ASTM F 439
Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; ASME B16.29; ASME B16.32
Gray iron and ductile iron	AWWA C110; AWWA C153
Malleable iron	ASME B16.3
Metal Insert Fittings Utilizing a Copper Crimp Ring SDR9 (PEX) Tubing	ASTM F 1807
Polyethylene (PE) plastic	ASTM D 2609
Polyvinyl chloride (PVC) plastic	ASTM D 2464; ASTM D 2466; ASTM D 2467; CSA CAN/CSA-B137.2
Steel	ASME B16.9; ASME B16.11; ASME B16.28

605.7 Valves. All valves shall be of the approved type and compatible with the type of piping material installed in the system.

605.8 Manufactured pipe nipples. Manufactured pipe nipples shall conform to one of the standards listed in Table 605.8.

TABLE 605.8
MANUFACTURED PIPE NIPPLES

MATERIAL	STANDARD
Steel	ASTM A 733
Brass-, copper-, chromium-plated	ASTM B 687

605.9 Prohibited joints and connections. The following types of joints and connections shall be prohibited:

1. Cement or concrete joints.
2. Joints made with fittings not approved for the specific installation.
3. Solvent-cement joints between different types of plastic pipe.
4. Saddle-type fittings.

605.10 ABS plastic. Joints between ABS plastic pipe or fittings shall comply with Sections 605.10.1 through 605.10.3.

605.10.1 Mechanical joints. Mechanical joints on water pipes shall be made with an elastomeric seal conforming to ASTM D 3139. Mechanical joints shall only be installed in underground systems, unless otherwise approved. Joints shall be installed in accordance with the manufacturer's instructions.

605.10.2 Solvent cementing. Joint surfaces shall be clean and free from moisture. Solvent cement that conforms to ASTM D 2235 shall be applied to all joint surfaces. The joint shall be made while the cement is wet. Joints shall be made in accordance with ASTM D 2235. Solvent-cement joints shall be permitted above or below ground.

605.10.3 Threaded joints. Threads shall conform to ASME B1.20.1. Schedule 80 or heavier pipe shall be permitted to be threaded with dies specifically designed for plastic pipe.

Approved thread lubricant or tape shall be applied on the male threads only.

605.11 Asbestos-cement. Joints between asbestos-cement pipe or fittings shall be made with a sleeve coupling of the same composition as the pipe, sealed with an elastomeric ring conforming to ASTM D 1869.

605.12 Brass. Joints between brass pipe or fittings shall comply with Sections 605.12.1 through 605.12.4.

605.12.1 Brazed joints. All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joint shall be brazed with a filler metal conforming to AWS A5.8.

605.12.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.12.3 Threaded joints. Threads shall conform to ASME B1.20.1. Pipe-joint compound or tape shall be applied on the male threads only.

605.12.4 Welded joints. All joint surfaces shall be cleaned. The joint shall be welded with an approved filler metal.

605.13 Gray iron and ductile iron joints. Joints for gray and ductile iron pipe and fittings shall comply with AWWA C111 and shall be installed in accordance with the manufacturer's installation instructions.

TABLE 605.13
LEAD DEPTH FOR CAULKED CAST-IRON PIPE

PIPE SIZE (inches)	DEPTH OF LEAD (inches)
Up to 20	2.25
24, 30, 36	2.5
Larger than 36	3

For SI: 1 inch = 25.4 mm.

605.14 Copper pipe. Joints between copper or copper-alloy pipe or fittings shall comply with Sections 605.14.1 through 605.14.5.

605.14.1 Brazed joints. All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joint shall be brazed with a filler metal conforming to AWS A5.8.

605.14.2 - 605.20.1

WATER SUPPLY AND DISTRIBUTION

605.14.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.14.3 Soldered joints. Solder joints shall be made in accordance with the methods of ASTM B 828. All cut tube ends shall be reamed to the full inside diameter of the tube end. All joint surfaces shall be cleaned. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32. The joining of water supply piping shall be made with lead-free solder and fluxes. "Lead free" shall mean a chemical composition equal to or less than 0.2-percent lead.

605.14.4 Threaded joints. Threads shall conform to ASME B1.20.1. Pipe-joint compound or tape shall be applied on the male threads only.

605.14.5 Welded joints. All joint surfaces shall be cleaned. The joint shall be welded with an approved filler metal.

605.15 Copper tubing. Joints between copper or copper-alloy tubing or fittings shall comply with Sections 605.15.1 through 605.15.4.

605.15.1 Brazed joints. All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joint shall be brazed with a filler metal conforming to AWS A5.8.

605.15.2 Flared joints. Flared joints for water pipe shall be made by a tool designed for that operation.

605.15.3 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.15.4 Soldered joints. Solder joints shall be made in accordance with the methods of ASTM B 828. All cut tube ends shall be reamed to the full inside diameter of the tube end. All joint surfaces shall be cleaned. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32. The joining of water supply piping shall be made with lead-free solders and fluxes. "Lead free" shall mean a chemical composition equal to or less than 0.2-percent lead.

605.16 CPVC plastic. Joints between CPVC plastic pipe or fittings shall comply with Sections 605.16.1 through 605.16.3.

605.16.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.16.2 Solvent cementing. Joint surfaces shall be clean and free from moisture, and an approved primer shall be applied. Solvent cement, orange in color and conforming to ASTM F 493 shall be applied to all joint surfaces. The joint shall be made while the cement is wet, and in accordance with ASTM D 2846 or ASTM F 493. Solvent-cement joints shall be permitted above or below ground.

Exception: A primer is not required where all of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM F493,
2. The solvent cement used is yellow in color,

3. The solvent cement is used only for joining 1/2 inch (12.7 mm) through 2 inch (51 mm) diameter CPVC pipe and fittings, and

4. The CPVC pipe and fittings are manufactured in accordance with ASTM D2846.

605.16.3 Threaded joints. Threads shall conform to ASME B1.20.1. Schedule 80 or heavier pipe shall be permitted to be threaded with dies specifically designed for plastic pipe, but the pressure rating of the pipe shall be reduced by 50 percent. Thread by socket molded fittings shall be permitted. Approved thread lubricant or tape shall be applied on the male threads only.

605.17 Cross-linked polyethylene plastic. Joints between cross-linked polyethylene plastic tubing or fittings shall comply with Sections 605.17.1 and 605.17.2.

605.17.1 Flared joints. Flared pipe ends shall be made by a tool designed for that operation.

605.17.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions. Metallic lock rings and insert fittings as described in ASTM F 1807 shall be installed in accordance with the manufacturer's instructions.

605.18 Steel. Joints between galvanized steel pipe or fittings shall comply with Sections 605.18.1 and 605.18.2.

605.18.1 Threaded joints. Threads shall conform to ASME B1.20.1. Pipe-joint compound or tape shall be applied on the male threads only.

605.18.2 Mechanical joints. Joints shall be made with an approved elastomeric seal. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.19 Polybutylene plastic. Joints between polybutylene plastic pipe and tubing or fittings shall comply with Sections 605.19.1 through 605.19.3.

605.19.1 Flared joints. Flared pipe ends shall be made by a tool designed for that operation.

605.19.2 Heat-fusion joints. Joints shall be of the socket-fusion or butt-fusion type. Joint surfaces shall be clean and free from moisture. All joint surfaces shall be heated to melt temperature and joined. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM D 2657, ASTM D 3309 or CSA CAN3-B137.8.

605.19.3 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions. Metallic lock rings employed with insert fittings as described in ASTM D 3309 or CSA CAN3-B137.8 shall be installed in accordance with the manufacturer's instructions.

605.20 Polyethylene plastic. Joints between polyethylene plastic pipe and tubing or fittings shall comply with Sections 605.20.1 through 605.20.4.

605.20.1 Flared joints. Flared joints shall be permitted where so indicated by the pipe manufacturer. Flared joints shall be made by a tool designed for that operation.

WATER SUPPLY AND DISTRIBUTION

605.20.2 - 606.5.2

605.20.2 Heat-fusion joints. Joint surfaces shall be clean and free from moisture. All joint surfaces shall be heated to melt temperature and joined. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM D 2657.

605.20.3 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

605.20.4 Installation. Polyethylene pipe shall be cut square, with a cutter designed for plastic pipe. Except where joined by heat fusion, pipe ends shall be chamfered to remove sharp edges. Kinked pipe shall not be installed. The minimum pipe bending radius shall not be less than 30 pipe diameters, or the minimum coil radius, whichever is greater. Piping shall not be bent beyond straightening of the curvature of the coil. Bends shall not be permitted within 10 pipe diameters of any fitting or valve. Stiffener inserts installed with compression-type couplings and fittings shall not extend beyond the clamp or nut of the coupling or fitting.

605.21 PVC plastic. Joints between PVC plastic pipe or fittings shall comply with Sections 605.21.1 through 605.21.3.

605.21.1 Mechanical joints. Mechanical joints on water pipe shall be made with an elastomeric seal conforming to ASTM D 3139. Mechanical joints shall not be installed in above-ground systems unless otherwise approved. Joints shall be installed in accordance with the manufacturer's instructions.

605.21.2 Solvent cementing. Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D 2564 or CSA CAN/CSA-B137.3 shall be applied to all joint surfaces. The joint shall be made while the cement is wet and shall be in accordance with ASTM D 2855. Solvent-cement joints shall be permitted above or below ground.

605.21.3 Threaded joints. Threads shall conform to ASME B1.20.1. Schedule 80 or heavier pipe shall be permitted to be threaded with dies specifically designed for plastic pipe, but the pressure rating of the pipe shall be reduced by 50 percent. Thread by socket molded fittings shall be permitted. Approved thread lubricant or tape shall be applied on the male threads only.

605.22 Joints between different materials. Joints between different piping materials shall be made with a mechanical joint of the compression or mechanical-sealing type, or as permitted in Sections 605.22.1 and 605.22.2. Connectors or adapters shall have an elastomeric seal conforming to ASTM D 1869 or ASTM F 477. Joints shall be installed in accordance with the manufacturer's instructions.

605.22.1 Copper or copper-alloy tubing to galvanized steel pipe. Joints between copper or copper-alloy tubing and galvanized steel pipe shall be made with a brass converter fitting or dielectric fitting. The copper tubing shall be soldered to the fitting in an approved manner, and the fitting shall be screwed to the threaded pipe.

605.22.2 Plastic pipe or tubing to other piping material. Joints between different grades of plastic pipe or between plastic pipe and other piping material shall be made with an approved adapter fitting.

SECTION 606 INSTALLATION OF THE BUILDING WATER DISTRIBUTION SYSTEM

606.1 Location of full-open valves. Full-open valves shall be installed in the following locations:

1. On the building water service pipe from the public water supply near the curb.
2. On the water distribution supply pipe at the entrance into the structure.
3. On the discharge side of every water meter.
4. On the base of every water riser pipe in occupancies other than multiple family residential occupancies that are two stories or less in height and in one- and two-family residential occupancies.
5. On the top of every water down-feed pipe in occupancies other than one- and two-family residential occupancies.
6. On the entrance to every water supply pipe to a dwelling unit, except where supplying a single fixture equipped with individual stops.
7. On the water supply pipe to a gravity or pressurized water tank.
8. On the water supply pipe to every water heater.

606.2 Location of shutoff valves. Shutoff valves shall be installed in the following locations:

1. On the fixture supply to each plumbing fixture in other than one- and two-family and multiple-family residential occupancies, and other than in individual guestrooms that are provided with unit shutoff valves in hotels, motels, boarding houses and similar occupancies.
2. On the water supply pipe to each sillcock.
3. On the water supply pipe to each appliance or mechanical equipment.

606.3 Access to valves. Access shall be provided to all required full-open valves and shutoff valves.

606.4 Valve identification. Service and hose bibb valves shall be identified. All other valves installed in locations that are not adjacent to the fixture or appliance shall be identified, indicating the fixture or appliance served.

606.5 Water pressure booster systems. Water pressure booster systems shall be provided as required by Sections 606.5.1 through 606.5.10.

606.5.1 Water pressure booster systems required. Where the water pressure in the public water main or individual water supply system is insufficient to supply the minimum pressures and quantities specified in this code, the supply shall be supplemented by an elevated water tank, a hydro-pneumatic pressure booster system or a water pressure booster pump installed in accordance with Section 606.5.5.

606.5.2 Support. All water supply tanks shall be supported in accordance with the *International Building Code*.

606.5.3 - 607.2

WATER SUPPLY AND DISTRIBUTION

606.5.3 Covers. All water supply tanks shall be covered to keep out unauthorized persons, dirt and vermin. The covers of gravity tanks shall be vented with a return bend vent pipe with an area not less than the area of the down-feed riser pipe, and the vent shall be screened with a corrosion-resistant screen of not less than 16 by 20 mesh per inch (630 by 787 mesh per m).

606.5.4 Overflows for water supply tanks. Each gravity or suction water supply tank shall be provided with an overflow with a diameter not less than that shown in Table 606.5.4. The overflow outlet shall discharge above and within not less than 6 inches (152 mm) of a roof or roof drain, floor or floor drain, or over an open water-supplied fixture. The overflow outlet shall be covered with a corrosion-resistant screen of not less than 16 by 20 mesh per inch (630 by 787 mesh per m) and by 0.25-inch (6.4 mm) hardware cloth or shall terminate in a horizontal angle seat check valve. Drainage from overflow pipes shall be directed so as not to freeze on roof walks.

TABLE 606.5.4
SIZES FOR OVERFLOW PIPES FOR WATER SUPPLY TANKS

MAXIMUM CAPACITY OF WATER SUPPLY LINE TO TANK (gpm)	DIAMETER OF OVERFLOW PIPE (inches)
0 - 50	2
50 - 150	2½
150 - 200	3
200 - 400	4
400 - 700	5
700 - 1,000	6
Over 1,000	8

For SI: 1 inch = 25.4 mm, 1 gallon per minute = 3.785 L/min.

606.5.5 Low-pressure cutoff required on booster pumps. A low-pressure cutoff shall be installed on all booster pumps in a water pressure booster system to prevent creation of a vacuum or negative pressure on the suction side of the pump when a positive pressure of 10 psi (68.94 kPa) or less occurs on the suction side of the pump.

606.5.6 Potable water inlet control and location. Potable water inlets to gravity tanks shall be controlled by a ball cock or other automatic supply valve installed so as to prevent the tank from overflowing. The inlet shall be terminated so as to provide an air gap not less than 4 inches (102 mm) above the overflow.

606.5.7 Tank drain pipes. A valved pipe shall be provided at the lowest point of each tank to permit emptying of the tank. The tank drain pipe shall discharge as required for

overflow pipes and shall not be smaller in size than specified in Table 606.5.7.

TABLE 606.5.7
SIZE OF DRAIN PIPES FOR WATER TANKS

TANK CAPACITY (gallons)	DRAIN PIPE (inches)
Up to 750	1
751 to 1,500	1½
1,501 to 3,000	2
3,001 to 5,000	2½
5,001 to 7,500	3
Over 7,500	4

For SI: 1 inch = 25.4 mm, 1 gallon = 3.785 L.

606.5.8 Prohibited location of potable supply tanks. Potable water gravity tanks or manholes of potable water pressure tanks shall not be located directly under any soil or waste piping or any source of contamination.

606.5.9 Pressure tanks, vacuum relief. All water pressure tanks shall be provided with a vacuum relief valve at the top of the tank that will operate up to a maximum water pressure of 200 psi (1380 kPa) and up to a maximum temperature of 200°F (93°C). The minimum size of such vacuum relief valve shall be 0.50 inch (12.7 mm).

Exception: This section shall not apply to pressurized captive air diaphragm/bladder tanks.

606.5.10 Pressure relief for tanks. Every pressure tank in a hydropneumatic pressure booster system shall be protected with a pressure relief valve. The pressure relief valve shall be set at a maximum pressure equal to the rating of the tank. The relief valve shall be installed on the supply pipe to the tank or on the tank. The relief valve shall discharge by gravity to a safe place of disposal.

606.6 Water supply system test. Upon completion of a section of or the entire water supply system, the system, or portion completed, shall be tested in accordance with Section 312.

SECTION 607 HOT WATER SUPPLY SYSTEM

607.1 Where required. In occupied structures, hot water shall be supplied to all plumbing fixtures and equipment utilized for bathing, washing, culinary purposes, cleansing, laundry or building maintenance. Tempered water shall be delivered from accessible hand-washing facilities.

Exception: In nonresidential occupancies, hot water or tempered water shall be supplied for bathing and washing purposes. This shall not apply to accessible hand washing facilities.

607.2 Hot water supply temperature maintenance. Where the developed length of hot water piping from the source of hot water supply to the farthest fixture exceeds 100 feet (30 480 mm), the hot water supply system shall be provided with a method of maintaining the temperature of hot water to within 100 feet (30 480 mm) of the fixtures. The methods of maintaining energy efficiency shall be in accordance with the *International Energy Conservation Code*.

WATER SUPPLY AND DISTRIBUTION

607.2.1 - 608.7

607.2.1 Piping insulation. Piping in required return circulation systems shall be insulated to provide a thermal resistance, R , excluding film resistances, of

$$R = \left[\frac{t_i - t_o}{25} (\text{hr.})(\text{ft.}^2)^{\circ}\text{F} \right] / \text{Btu} \quad (6-1)$$

For SI: $R = [t_i - t_o(0.0304) \text{ K} \cdot \text{m}^2] / \text{W}$

where:

$t_i - t_o$ = the design temperature differential between the water in the pipe and the surrounding air in degrees Fahrenheit.

Exception: Pipe insulation is not required where $t_i - t_o$ is 25°F (14°C) or less.

607.2.2 Pump operation. Where a circulating pump is installed on a return circulation hot water system, the pump shall be arranged to shut off automatically or to allow manual shut off when the hot water system is not in operation.

607.3 Thermal expansion control. A means of controlling increased pressure caused by thermal expansion shall be provided where required in accordance with Sections 607.3.1 and 607.3.2.

607.3.1 Pressure-reducing valve. For water service system sizes up to and including 2 inches (51 mm), a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the main supply pressure. A pressure-reducing valve with an integral bypass check valve or other device shall be installed to satisfy this requirement.

607.3.2 Backflow prevention device or check valve. Where a backflow prevention device, check valve or other device is installed on a water supply system utilizing storage water heating equipment such that thermal expansion causes an increase in pressure, a device for controlling pressure shall be installed.

607.4 Hot water supply to fixtures. The hot water supply to any fixture shall be installed on the left side of the fixture.

SECTION 608

PROTECTION OF POTABLE WATER SUPPLY

608.1 General. A potable water supply system shall be designed, installed and maintained in such a manner so as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply through cross-connections or any other piping connections to the system. Backflow preventer applications shall conform to Table 608.1, except as specifically stated in Sections 608.2 through 608.16.9.

608.2 Plumbing fixtures. The supply lines or fittings for every plumbing fixture shall be installed so as to prevent backflow.

608.3 Devices, appurtenances, appliances and apparatus. All devices, appurtenances, appliances and apparatus intended to serve some special function, such as sterilization, distilla-

tion, processing, cooling, or storage of ice or foods, and that connect to the water supply system, shall be provided with protection against backflow and contamination of the water supply system. Water pumps, filters, softeners, tanks and all other appliances and devices that handle or treat potable water shall be protected against contamination.

608.3.1 Special equipment, water supply protection. The water supply for hospital fixtures shall be protected against backflow with a reduced pressure principle backflow preventer, an atmospheric or spill-proof vacuum breaker, or an air gap. Vacuum breakers for bedpan washer hoses shall not be located less than 5 feet (1524 mm) above the floor. Vacuum breakers for hose connections in health care or laboratory areas shall not be less than 6 feet (1829 mm) above the floor.

608.4 Water service piping. Water service piping shall be protected in accordance with Sections 603.2 and 603.2.1.

608.5 Chemicals and other substances. Chemicals and other substances that produce either toxic conditions, taste, odor or discoloration in a potable water system shall not be introduced into, or utilized in, such systems.

608.6 Cross-connection control. Cross connections shall be prohibited, except where approved protective devices are installed.

608.6.1 Private water supplies. Cross connections between a private water supply and a potable public supply shall be prohibited.

608.7 Stop-and-waste valves prohibited. Combination stop-and-waste valves or cocks shall not be installed underground.

TABLE 608.1 - 608.8.3

WATER SUPPLY AND DISTRIBUTION

TABLE 608.1
APPLICATION FOR BACKFLOW PREVENTERS

DEVICE	DEGREE OF HAZARD ^a	APPLICATION ^b	APPLICABLE STANDARDS
Air gap	High or low hazard	Backsiphonage or backpressure	ASME A112.1.2
Antisiphon-type water closet flush tank ball cock	Low hazard	Backsiphonage only	ASSE 1002 CSA CAN/ B125
Barometric loop	High or low hazard	Backsiphonage only	(See Section 608.13.4)
Reduced pressure principle backflow preventer	High or low hazard	Backpressure or backsiphonage Sizes $\frac{3}{8}$ " - 16"	ASSE 1013 AWWA C511 CSA CAN/CSA-B64.4
Reduced pressure detector assembly backflow preventer	High or low hazard	Backsiphonage or backpressure (Fire sprinkler systems)	ASSE 1047
Double check backflow prevention assembly	Low hazard	Backpressure or backsiphonage Sizes $\frac{3}{8}$ " - 16"	ASSE 1015 AWWA C510
Double check detector assembly backflow preventer	Low hazard	Backpressure or backsiphonage (Fire sprinkler systems) Sizes $1\frac{1}{2}$ " - 16"	ASSE 1048
Dual-check-valve-type backflow preventer	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " - 1"	ASSE 1024
Backflow preventer with intermediate atmospheric vents	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " - $\frac{3}{4}$ "	ASSE 1012 CSA CAN/CSA-B64.3
Dual-check-valve-type backflow preventer for carbonated beverage dispensers/post mix type	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " - $\frac{3}{8}$ "	ASSE 1032
Pipe-applied atmospheric-type vacuum breaker	High or low hazard	Backsiphonage only Sizes $\frac{1}{4}$ " - 4"	ASSE 1001 CSA CAN/CSA-B64.1.1
Pressure vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes $\frac{1}{2}$ " - 2"	ASSE 1020
Hose-connection vacuum breaker	High or low hazard	Low head backpressure or backsiphonage Sizes $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1"	ASSE 1011 CSA CAN/CSA-B64.2
Vacuum breaker wall hydrants, frost-resistant, automatic draining type	High or low hazard	Low head backpressure or backsiphonage Sizes $\frac{3}{4}$ ", 1"	ASSE 1019 CSA CAN/CSA-B64.2.2
Laboratory faucet backflow preventer	High or low hazard	Low head backpressure and backsiphonage	ASSE 1035 CSA B64.7
Hose connection backflow preventer	High or low hazard	Low head backpressure, rated working pressure backpressure or backsiphonage Sizes $\frac{1}{2}$ " - 1"	ASSE 1052
Spill-proof vacuum breaker	High or low hazard	Backsiphonage only Sizes $\frac{1}{4}$ " - 2"	ASSE 1056

For SI: 1 inch = 25.4 mm.

a. Low hazard—See Pollution (Section 202).

High hazard—See Contamination (Section 202).

b. See Backpressure (Section 202).

See Backpressure, Low Head (Section 202).

See Backsiphonage (Section 202).

608.8 Identification of potable and nonpotable water. In buildings where two or more water distribution systems, one potable water and the other nonpotable water, are installed, each system shall be identified either by color marking or metal tags in accordance with Sections 608.8.1 through 608.8.3, unless otherwise approved by the code official.

608.8.1 Information. Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also con-

tain information addressing the nature of the hazard. Pipe identification shall be repeated at maximum intervals of 25 feet (7620 mm) and at each point where the piping passes through a wall, floor or roof. Lettering shall be readily observable within the room or space the piping is located.

608.8.2 Color. The color of the pipe identification shall be discernable and consistent throughout the building.

608.8.3 Size. The size of the background color field and lettering shall comply with Table 608.8.3.

WATER SUPPLY AND DISTRIBUTION

TABLE 608.8.3 - 608.15.4

TABLE 608.8.3
SIZE OF PIPE IDENTIFICATION

PIPE DIAMETER (inches)	LENGTH OF BACKGROUND COLOR FIELD (inches)	SIZE OF LETTERS (inches)
3/4 to 1 1/4	8	0.5
1 1/2 to 2	8	0.75
2 1/2 to 6	12	1.25
8 to 10	24	2.5
over 10	32	3.5

For SI: 1 inch = 25.4 mm.

608.9 Reutilization prohibited. Water utilized for the cooling of equipment or other processes shall not be returned to the potable water system. Such water shall be discharged into a drainage system through an air gap or shall be utilized for non-potable purposes.

608.10 Reuse of piping. Piping that has been utilized for any purpose other than conveying potable water shall not be utilized for conveying potable water.

608.11 Painting of water tanks. The interior surface of a potable water tank shall not be lined, painted or repaired with any material that changes the taste, odor, color or potability of the water supply when the tank is placed in, or returned to, service.

608.12 Pumps and other appliances. Water pumps, filters, softeners, tanks and all other devices that handle or treat potable water shall be protected against contamination.

608.13 Backflow protection. Means of protection against backflow shall be provided in accordance with Sections 608.13.1 through 608.13.9.

608.13.1 Air gap. The minimum required air gap shall be measured vertically from the lowest end of a potable water outlet to the flood level rim of the fixture or receptacle into which such potable water outlet discharges.

608.13.2 Reduced pressure principle backflow preventers. Reduced pressure principle backflow preventers shall conform to ASSE 1013, AWWA C511 or CSA CAN/CSA-B64.3. Reduced pressure detector assembly backflow preventers shall conform to ASSE 1047. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

608.13.3 Backflow preventer with intermediate atmospheric vent. Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CSA CAN/CSA-B64.3. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

608.13.4 Barometric loop. Barometric loops shall precede the point of connection and shall extend vertically to a height of 35 feet (10 668 mm). A barometric loop shall only be utilized as an atmospheric-type or pressure-type vacuum breaker.

608.13.5 Pressure-type vacuum breakers. Pressure-type vacuum breakers shall conform to ASSE 1020 and spill-proof vacuum breakers shall comply with ASSE 1056. These devices are designed for installation under continuous pressure conditions when the critical level is installed at the required height. Pressure-type vacuum breakers shall not be installed in locations where spillage could cause damage to the structure.

608.13.6 Atmospheric-type vacuum breakers. Pipe-applied atmospheric-type vacuum breakers shall conform to ASSE 1001 or CSA CAN/CSA-B64.1.1. Hose-connection vacuum breakers shall conform to ASSE 1011, ASSE 1019, ASSE 1035, ASSE 1052, CSA CAN/CSA-B64.2, CSA CAN/CSA-B64.2.2 or CSA B64.7. These devices shall operate under normal atmospheric pressure when the critical level is installed at the required height.

608.13.7 Double check-valve assemblies. Double check-valve assemblies shall conform to ASSE 1015 or AWWA C510. Double-detector check-valve assemblies shall conform to ASSE 1048. These devices shall be capable of operating under continuous pressure conditions.

608.13.8 Spill-proof vacuum breakers. Spill-proof vacuum breakers (SVB) shall conform to ASSE 1056. These devices are designed for installation under continuous-pressure conditions when the critical level is installed at the required height.

608.13.9 Chemical dispenser backflow devices. Backflow devices for chemical dispensers shall comply with ASSE 1055.

608.14 Location of backflow preventers. Access shall be provided to backflow preventers as specified by the installation instructions of the approved manufacturer.

608.14.1 Outdoor enclosures for backflow prevention devices. Outdoor enclosures for backflow prevention devices shall comply with ASSE 1060.

608.15 Protection of potable water outlets. All potable water openings and outlets shall be protected against backflow in accordance with Section 608.15.1, 608.15.2, 608.15.3, 608.15.4, 608.15.4.1, 608.15.4.2 or 608.15.4.3.

608.15.1 Protection by air gap. Openings and outlets shall be protected by an air gap between the opening and the fixture flood level rim as specified in Table 608.15.1. Openings and outlets equipped for hose connection shall be protected by means other than an air gap.

608.15.2 Protection by a reduced pressure principle backflow preventer. Openings and outlets shall be protected by a reduced pressure principle backflow preventer.

608.15.3 Protection by a backflow preventer with intermediate atmospheric vent. Openings and outlets shall be protected by a backflow preventer with an intermediate atmospheric vent.

608.15.4 Protection by a vacuum breaker. Openings and outlets shall be protected by atmospheric-type or pressure-type vacuum breakers. The critical level of the vacuum breaker shall be set a minimum of 6 inches (152 mm) above

TABLE 608.15.1 - 608.16.4

WATER SUPPLY AND DISTRIBUTION

the flood level rim of the fixture or device. Ball cocks shall be set in accordance with Section 425.4.1. Vacuum breakers shall not be installed under exhaust hoods or similar locations that will contain toxic fumes or vapors. Pipe-applied

vacuum breakers shall be installed not less than 6 inches (152 mm) above the flood level rim of the fixture, receptor or device served.

TABLE 608.15.1
MINIMUM REQUIRED AIR GAPS

FIXTURE	MINIMUM AIR GAP	
	Away from a wall ^a (inches)	Close to a wall (inches)
Lavatories and other fixtures with effective opening not greater than 1/2 inch in diameter	1	1 1/2
Sink, laundry trays, gooseneck back faucets and other fixtures with effective openings not greater than 3/4 inch in diameter	1.5	2.5
Over-rim bath fillers and other fixtures with effective openings not greater than 1 inch in diameter	2	3
Drinking water fountains, single orifice not greater than 7/16 inch in diameter or multiple orifices with a total area of 0.150 square inch (area of circle 7/16 inch in diameter)	1	1 1/2
Effective openings greater than 1 inch	Two times the diameter of the effective opening	Three times the diameter of the effective opening

For SI: 1 inch = 25.4 mm.

a. Applicable where walls or obstructions are spaced from the nearest inside edge of the spout opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the diameter of the effective opening for two intersecting walls.

608.15.4.1 Deck-mounted and integral vacuum breakers. Approved deck-mounted or equipment-mounted vacuum breakers and faucets with integral atmospheric or spill-proof vacuum breakers shall be installed in accordance with the manufacturer's instructions and the requirements for labeling with the critical level not less than 1 inch (25.4 mm) above the flood level rim.

608.15.4.2 Hose connections. Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection shall be protected by an atmospheric-type or pressure-type vacuum breaker or a permanently attached hose connection vacuum breaker.

Exceptions:

1. This section shall not apply to water heater and boiler drain valves that are provided with hose connection threads and that are intended only for tank or vessel draining.
2. This section shall not apply to water supply valves intended for connection of clothes washing machines where backflow prevention is otherwise provided or is integral with the machine.

608.15.4.3 Fittings with hose-connected outlets. Plumbing fixture fittings with hose-connected outlets shall have backflow protection in compliance with ASME A112.18.3.

608.16 Connections to the potable water system. Connections to the potable water system shall conform to Sections 608.16.1 through 608.16.9.

608.16.1 Beverage dispensers. The water supply connection to carbonated beverage dispensers shall be protected against backflow by a double check valve with an intermediate atmospheric vent conforming to ASSE 1012 or ASSE

1022. The double check valve with an intermediate atmospheric vent device and the piping downstream therefrom shall not be affected by carbon dioxide gas. Secondary protection in the form of a dual check valve conforming to ASSE 1032 shall be installed on the beverage-dispensing equipment.

608.16.2 Connections to boilers. The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA CAN/CSA B64.3. Where conditioning chemicals are introduced into the system, the potable water connection shall be protected by an air gap or a reduced pressure principle backflow preventer, complying with ASSE 1013, CSA CAN/CSA B64.4 or AWWA C511.

608.16.3 Heat exchangers. Heat exchangers utilizing an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

608.16.4 Connections to automatic fire sprinkler systems and standpipe systems. The potable water supply to automatic fire sprinkler and standpipe systems shall be protected against backflow by a double check-valve assembly or a reduced pressure principle backflow preventer.

Exceptions:

1. Where systems are installed as a portion of the water distribution system in accordance with the requirements of this code and are not provided with a fire department connection, isolation of the water supply system shall not be required.
2. Isolation of the water distribution system is not required for deluge, preaction or dry pipe systems.

WATER SUPPLY AND DISTRIBUTION

608.16.4.1 - 608.17.7

608.16.4.1 Additives or nonpotable source. Where systems contain chemical additives or antifreeze, or where systems are connected to a nonpotable secondary water supply, the potable water supply shall be protected against backflow by a reduced pressure principle backflow preventer. Where chemical additives or antifreeze are added to only a portion of an automatic fire sprinkler or stand-pipe system, the reduced pressure principle backflow preventer shall be permitted to be located so as to isolate that portion of the system.

608.16.5 Connections to lawn irrigation systems. The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric-type vacuum breaker, a pressure-type vacuum breaker or a reduced pressure principle backflow preventer. A valve shall not be installed downstream from an atmospheric vacuum breaker. Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a reduced pressure principle backflow preventer.

608.16.6 Connections subject to back pressure. Where a potable water connection is made to a nonpotable line, fixture, tank, vat, pump or other equipment subject to back pressure, the potable water connection shall be protected by a reduced pressure principle backflow preventer.

608.16.7 Chemical dispensers. Where chemical dispensers connect to the potable water distribution system, the water supply system shall be protected against backflow in accordance with Section 608.13.1, 608.13.2, 608.13.3, 608.13.5, 608.13.6, 608.13.8 or 608.13.9.

608.16.8 Portable cleaning equipment. Where the portable cleaning equipment connects to the water distribution system, the water supply system shall be protected against backflow in accordance with Section 608.13.1, 608.13.2, 608.13.3, 608.13.7 or 608.13.8.

608.16.9 Dental pump equipment. Where dental pumping equipment connects to the water distribution system, the water supply system shall be protected against backflow in accordance with Section 608.13.1, 608.13.5, 608.13.6 or 608.13.8.

608.17 Protection of individual water supplies. An individual water supply shall be located and constructed so as to be safeguarded against contamination in accordance with Sections 608.17.1 through 608.17.8.

608.17.1 Well locations. A potable ground water source or pump suction line shall not be located closer to potential sources of contamination than the distances shown in Table 608.17.1. In the event the underlying rock structure is limestone or fragmented shale, the local or state health department shall be consulted on well site location. The distances in Table 608.17.1 constitute minimum separation and shall be increased in areas of creviced rock or limestone, or where the direction of movement of the ground water is from sources of contamination toward the well.

TABLE 608.17.1
DISTANCE FROM SOURCES OF CONTAMINATION TO
PRIVATE WATER SUPPLIES AND PUMP SUCTION LINES

SOURCE OF CONTAMINATION	DISTANCE (feet)
Barnyard	100
Farm silo	25
Pasture	100
Pumphouse floor drain of cast iron draining to ground surface	2
Seepage pits	50
Septic tank	25
Sewer	10
Subsurface disposal fields	50
Subsurface pits	50

For SI: 1 foot = 304.8 mm.

608.17.2 Elevation. Well sites shall be positively drained and shall be at higher elevations than potential sources of contamination.

608.17.3 Depth. Private potable well supplies shall not be developed from a water table less than 10 feet (3048 mm) below the ground surface.

608.17.4 Water-tight casings. Each well shall be provided with a water-tight casing to a minimum distance of 10 feet (3048 mm) below the ground surface. All casings shall extend at least 6 inches (152 mm) above the well platform. The casing shall be large enough to permit installation of a separate drop pipe. Casings shall be sealed at the bottom in an impermeable stratum or extend several feet into the water-bearing stratum.

608.17.5 Drilled or driven well casings. Drilled or driven well casings shall be of steel or other approved material. Where drilled wells extend into a rock formation, the well casing shall extend to and set firmly in the formation. The annular space between the earth and the outside of the casing shall be filled with cement grout to a minimum distance of 10 feet (3048 mm) below the ground surface. In an instance of casing to rock installation, the grout shall extend to the rock surface.

608.17.6 Dug or bored well casings. Dug or bored well casings shall be of water-tight concrete, tile, or galvanized or corrugated metal pipe to a minimum distance of 10 feet (3048 mm) below the ground surface. Where the water table is more than 10 feet (3048 mm) below the ground surface, the water-tight casing shall extend below the table surface. Well casings for dug wells or bored wells constructed with sections of concrete, tile, or galvanized or corrugated metal pipe shall be surrounded by 6 inches (152 mm) of grout poured into the hole between the outside of the casing and the ground to a minimum depth of 10 feet (3048 mm).

608.17.7 Cover. Every potable water well shall be equipped with an overlapping water-tight cover at the top of the casing well or pipe sleeve such that contaminated water or other substances are prevented from entering the well through the annular opening at the top of the well casing, wall or pipe sleeve. Covers shall extend downward at least 2 inches

608.17.8 - 612.1

WATER SUPPLY AND DISTRIBUTION

(51 mm) over the outside of the well casing or wall. A dug well cover shall be provided with a pipe sleeve permitting the withdrawal of the pump suction pipe, cylinder or jet body without disturbing the cover. Where pump sections or discharge pipes enter or leave a well through the side of the casing, the circle of contact shall be water tight.

608.17.8 Drainage. All potable water wells and springs shall be constructed such that surface drainage will be diverted away from the well or spring.

SECTION 609 HEALTH CARE PLUMBING

609.1 Scope. This section shall govern those aspects of health care plumbing systems that differ from plumbing systems in other structures. Health care plumbing systems shall conform to the requirements of this section in addition to the other requirements of this code. The provisions of this section shall apply to the special devices and equipment installed and maintained in the following occupancies: nursing homes, homes for the aged, orphanages, infirmaries, first aid stations, psychiatric facilities, clinics, professional offices of dentists and doctors, mortuaries, educational facilities, surgery, dentistry, research and testing laboratories, establishments manufacturing pharmaceutical drugs and medicines, and other structures with similar apparatus and equipment classified as plumbing.

609.2 Water service. All hospitals shall have two water service pipes installed in such a manner so as to minimize the potential for an interruption of the supply of water in the event of a water main or water service pipe failure.

609.3 Hot water. Hot water shall be provided to supply all of the hospital fixture, kitchen and laundry requirements. Special fixtures and equipment shall have hot water supplied at a temperature specified by the manufacturer. The hot water system shall be installed in accordance with Section 607.

609.4 Vacuum breaker installation. Vacuum breakers shall be installed a minimum of 6 inches (152 mm) above the flood level rim of the fixture or device in accordance with Section 608. The flood level rim of hose connections shall be the maximum height at which any hose is utilized.

609.5 Prohibited water closet and clinical sink supply. Jet- or water-supplied orifices, except those supplied by the flush connections, shall not be located in or connected with a water closet bowl or clinical sink. This section shall not prohibit an approved bidet installation.

609.6 Clinical, hydrotherapeutic and radiological equipment. All clinical, hydrotherapeutic, radiological or any equipment that is supplied with water or that discharges to the waste system shall conform to the requirements of this section and Section 608.

609.7 Condensate drain trap seal. A water supply shall be provided for cleaning, flushing and resealing the condensate trap, and the trap shall discharge through an air gap in accordance with Section 608.

609.8 Valve leakage diverter. Each water sterilizer filled with water through directly connected piping shall be equipped with

an approved leakage diverter or bleed line on the water supply control valve to indicate and conduct any leakage of unsterile water away from the sterile zone.

SECTION 610 DISINFECTION OF POTABLE WATER SYSTEM

610.1 General. New or repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization. The method to be followed shall be that prescribed by the health authority or water purveyor having jurisdiction or, in the absence of a prescribed method, the procedure described in either AWWA C651 or AWWA C652, or as described in this section. This requirement shall apply to "on-site" or "in-plant" fabrication of a system or to a modular portion of a system.

1. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlet.
2. The system or part thereof shall be filled with a water/chlorine solution containing at least 50 parts per million (50 mg/L) of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million (200 mg/L) of chlorine and allowed to stand for 3 hours.
3. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purged from the system.
4. The procedure shall be repeated where shown by a bacteriological examination that contamination remains present in the system.

SECTION 611 DRINKING WATER TREATMENT UNITS

611.1 Design. Drinking water treatment units shall meet the requirements of NSF 42, NSF 44, NSF 53 or NSF 62.

611.2 Reverse osmosis systems. The discharge from a reverse osmosis drinking water treatment unit shall enter the drainage system through an air gap or an air gap device that meets the requirements of NSF 58.

611.3 Connection tubing. The tubing to and from drinking water treatment units shall be of a size and material as recommended by the manufacturer. The tubing shall comply with NSF 14, NSF 42, NSF 44, NSF 53, NSF 58 or NSF 61.

SECTION 612 SOLAR SYSTEMS

612.1 Solar systems. The construction, installation, alterations and repair of systems, equipment and appliances intended to utilize solar energy for space heating or cooling, domestic hot water heating, swimming pool heating or process heating shall be in accordance with the *International Mechanical Code*.

CERTIFICATION

I, Michael J. Moore, the duly appointed and acting Building Official for Lexington County, hereby certify that the attached Building Codes Ordinance, amended June 10, 2003, was in effect from and as of that date and until April 8, 2008, when it was further amended by Ordinance 08-1 of Lexington County.


Michael J. Moore

Lexington, South Carolina
July 20 2009

BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA

DOCKET NO. 2009-39-W

IN RE:

Lisa Lochbaum,
Complainant/Petitioner

v.

Utilities Services of South Carolina, Inc.,
Defendant/Respondent

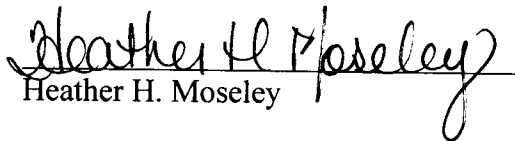
CERTIFICATE OF SERVICE

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COMMISSION

This is to certify that I have caused to be served this day one (1) copy of the **Surrebuttal**
Testimony of Bruce T. Haas in the above-referenced action by hand delivery as follows:

Lisa Lochbaum
221 Dutchman Shores Circle
Chapin, SC 29036

Jeffrey M. Nelson, Esquire
Office of Regulatory Staff
Post Office Box 11263
Columbia, South Carolina 29211


Heather H. Moseley

Columbia, South Carolina
This 20th day of July, 2009.